

# BASIC ELEMENTS OF SYSTEM FOR ANALYSIS OF VARIABLES

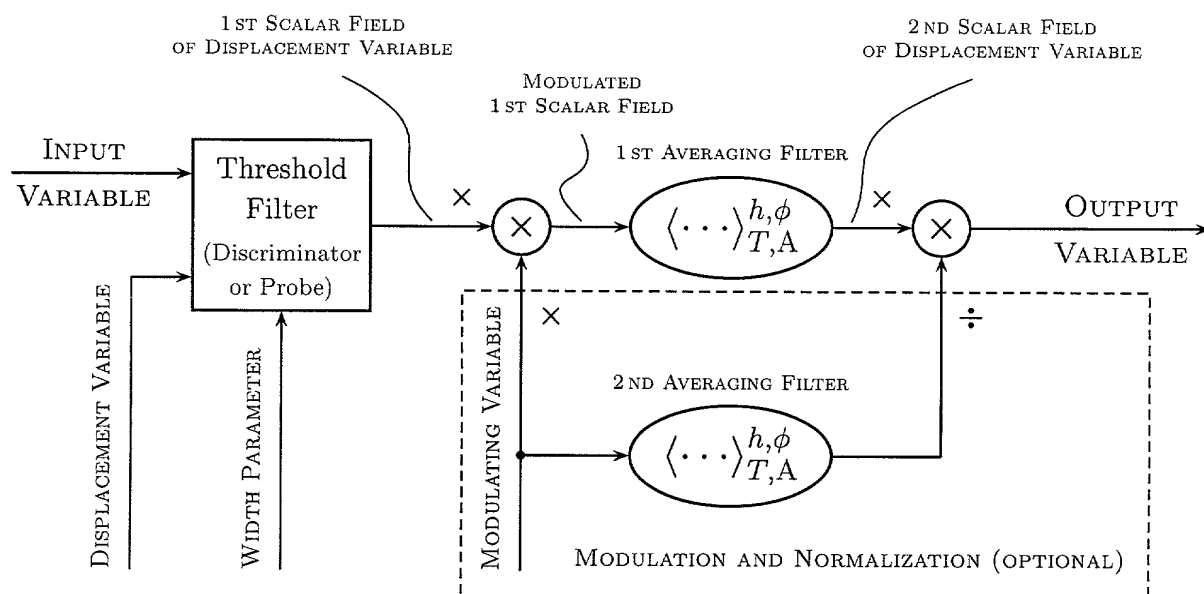


Fig. 1 a

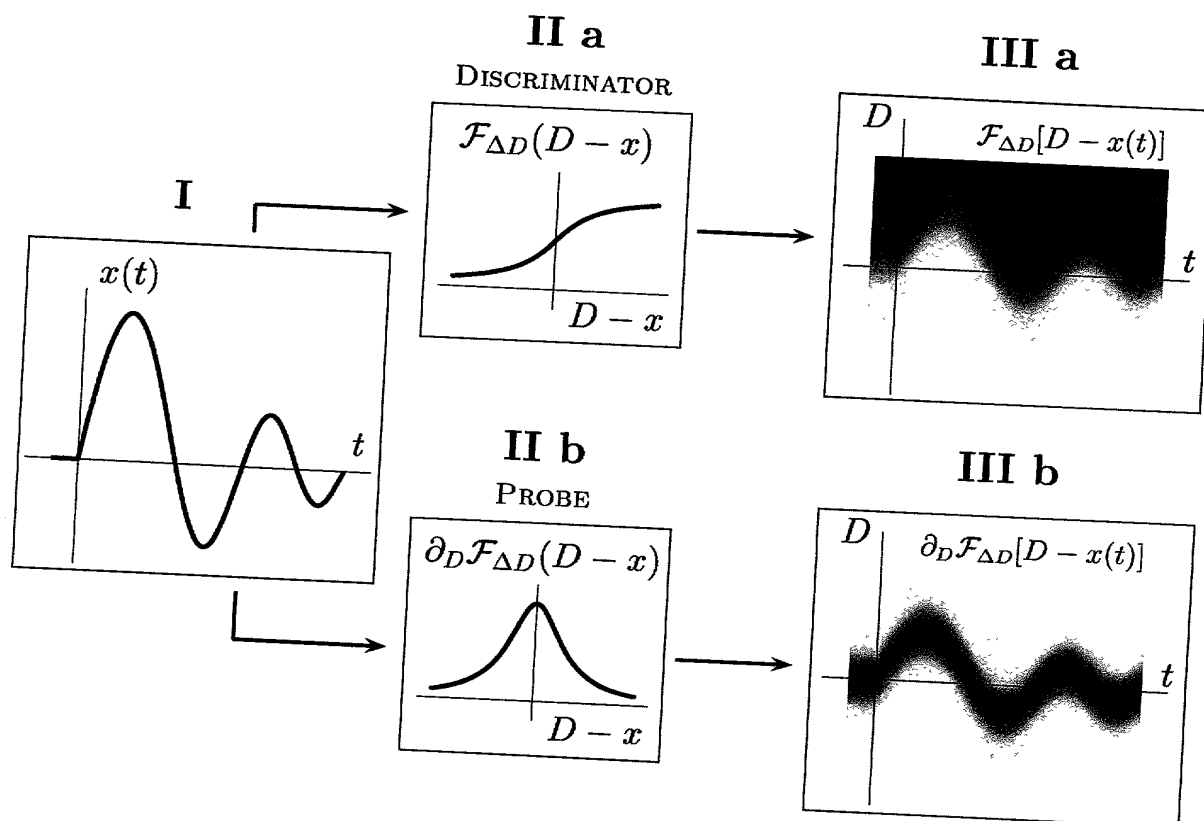


Fig. 1 b

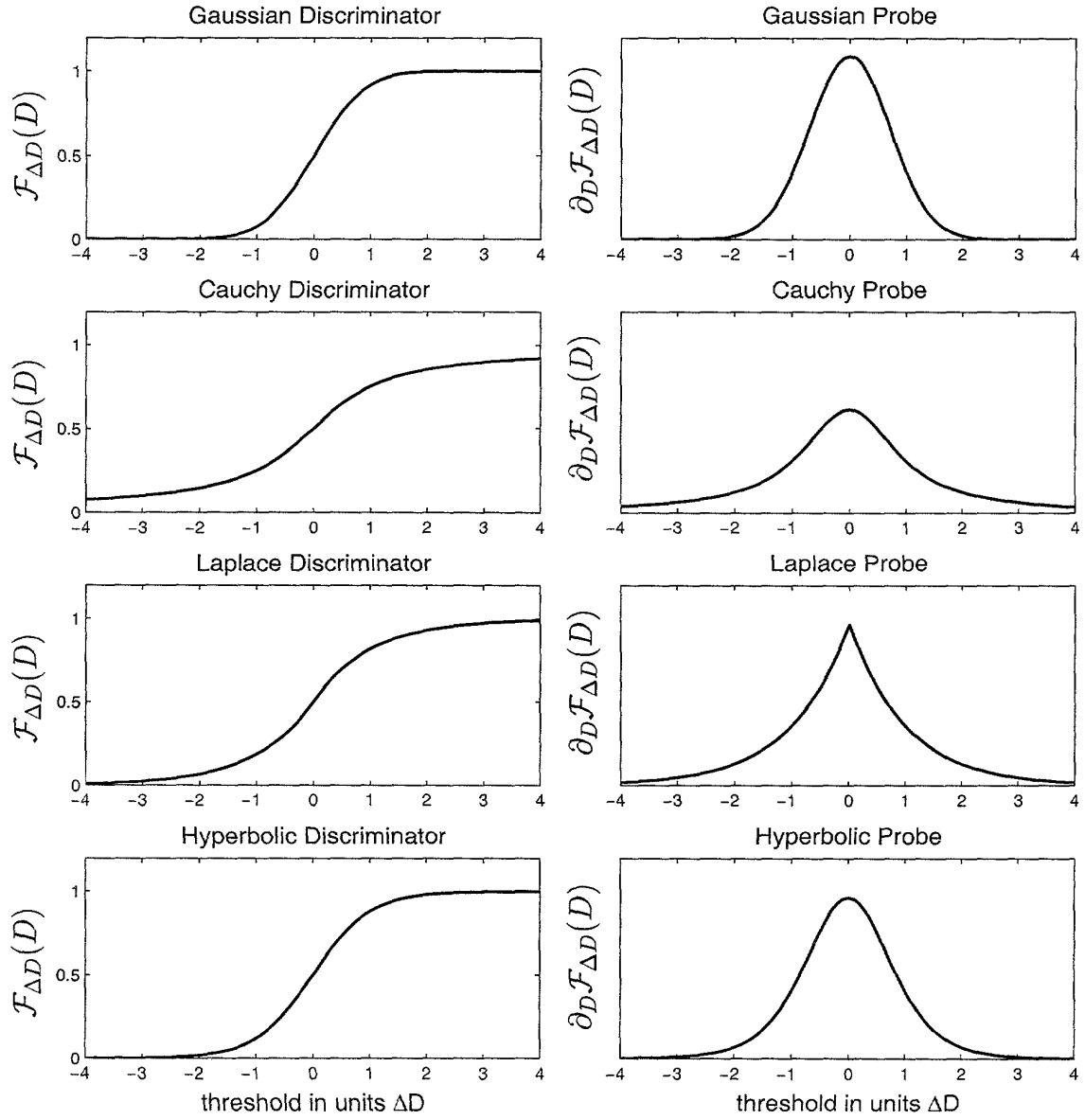


Fig. 2

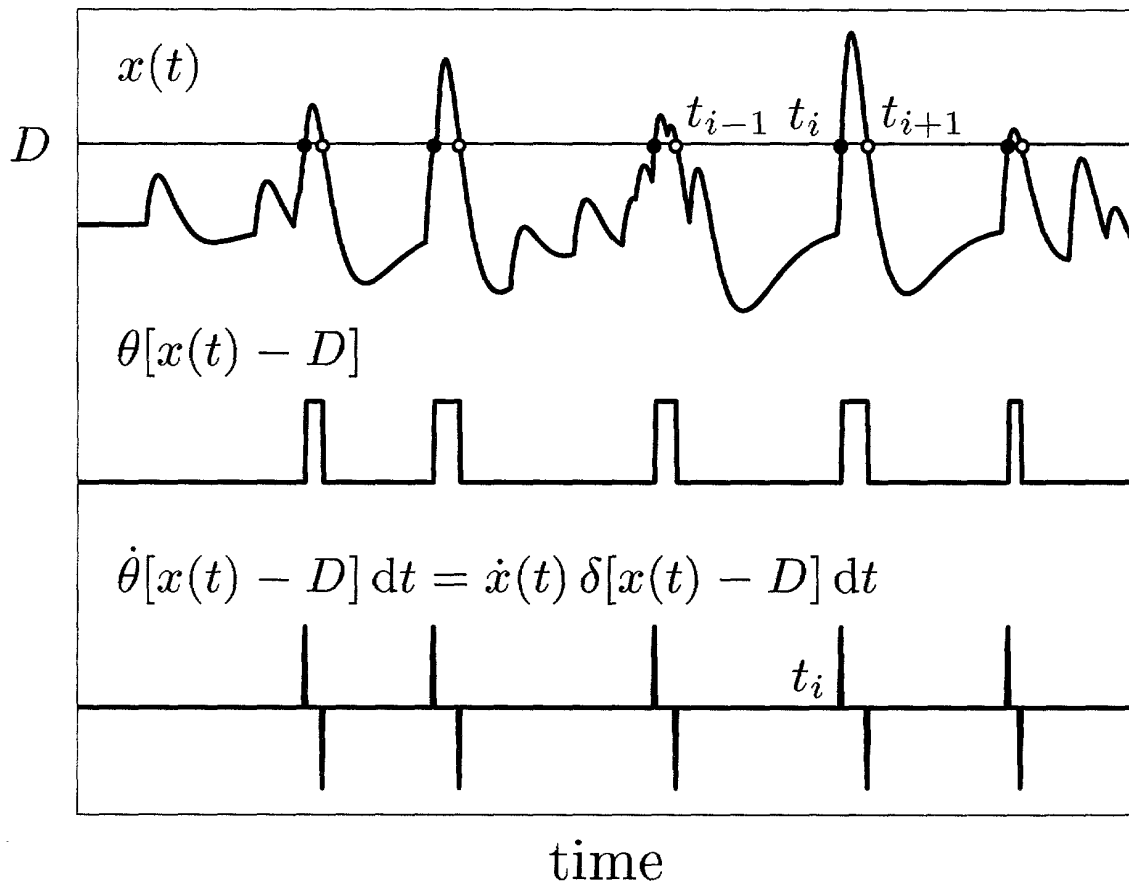


Fig. 3

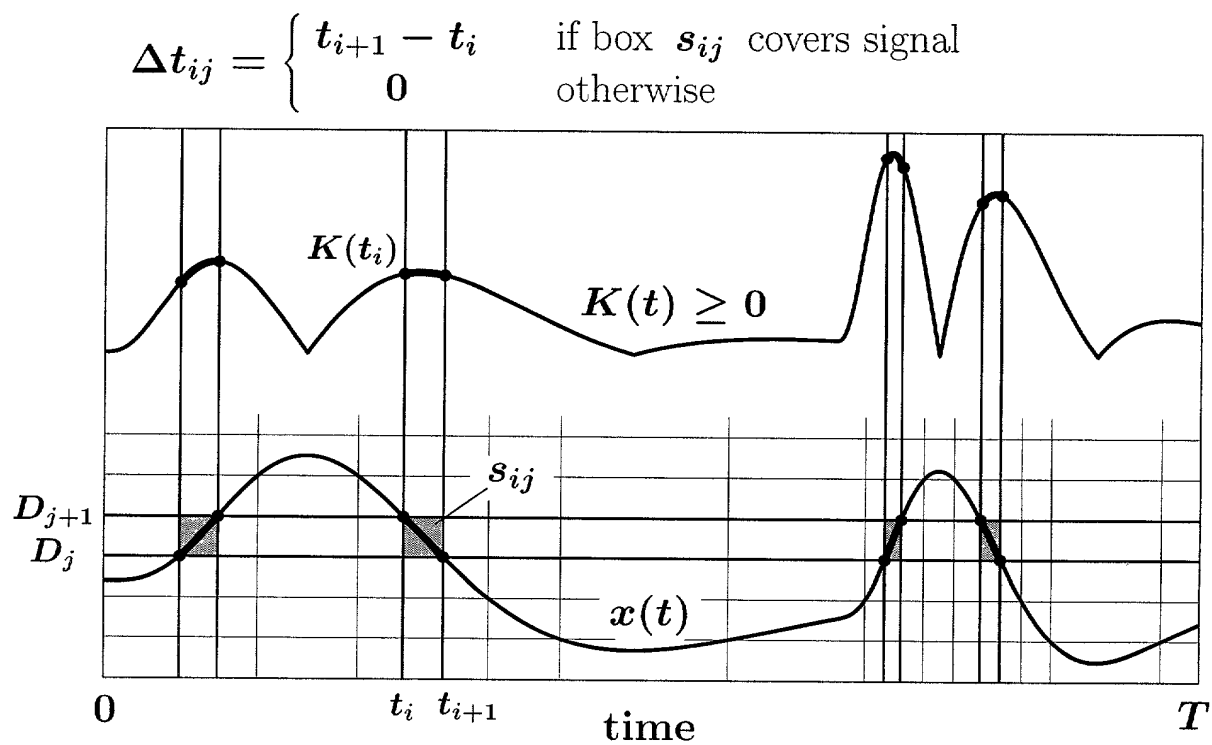


Fig. 4

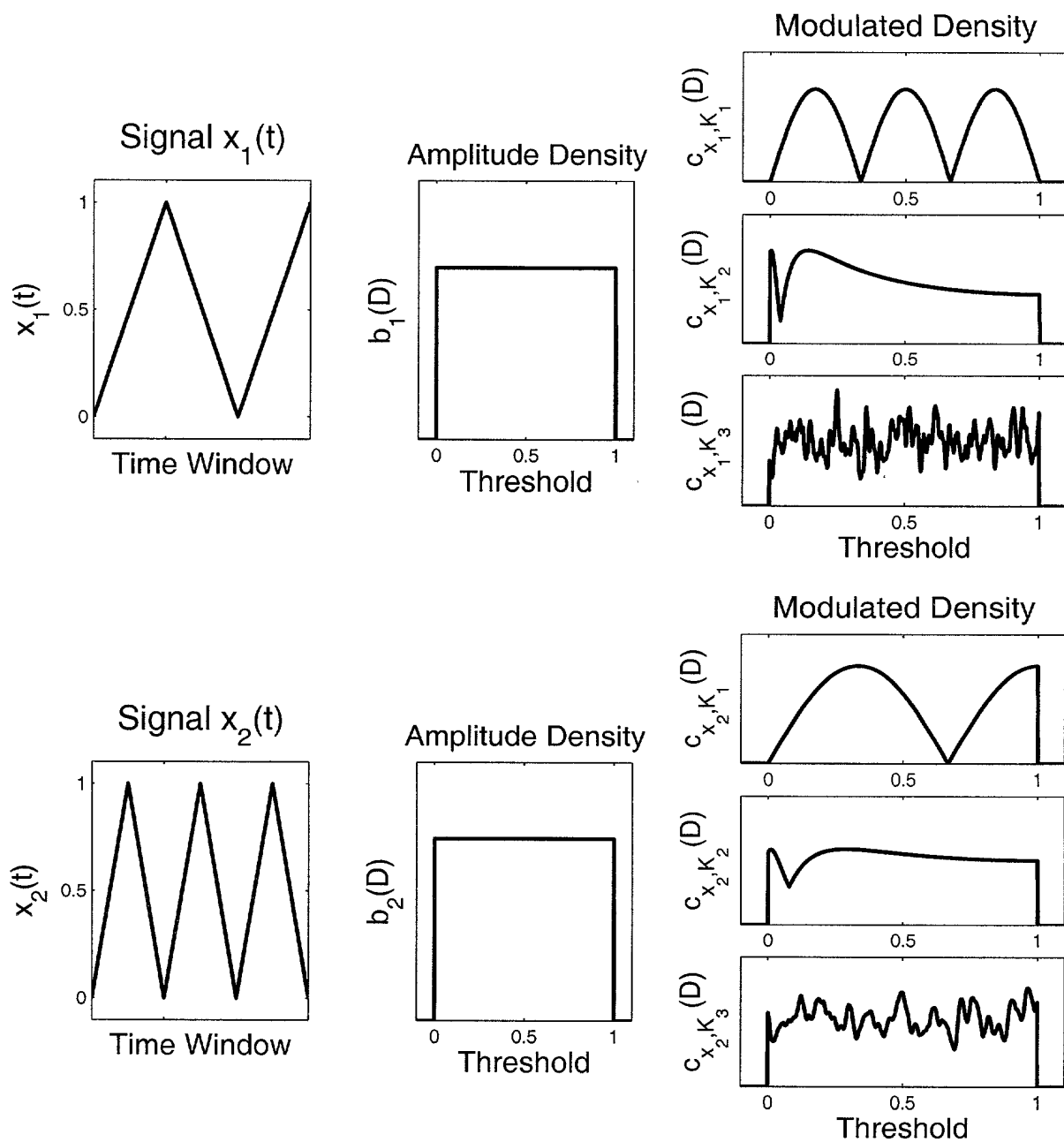


Fig. 5

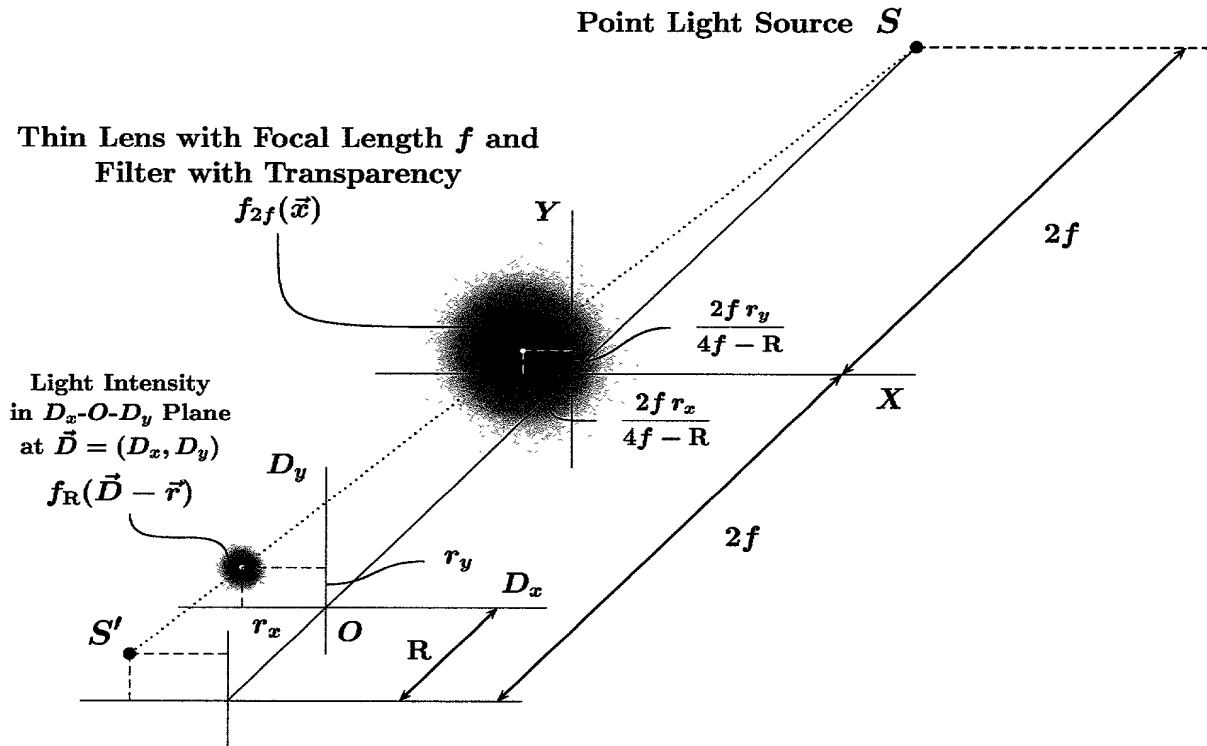
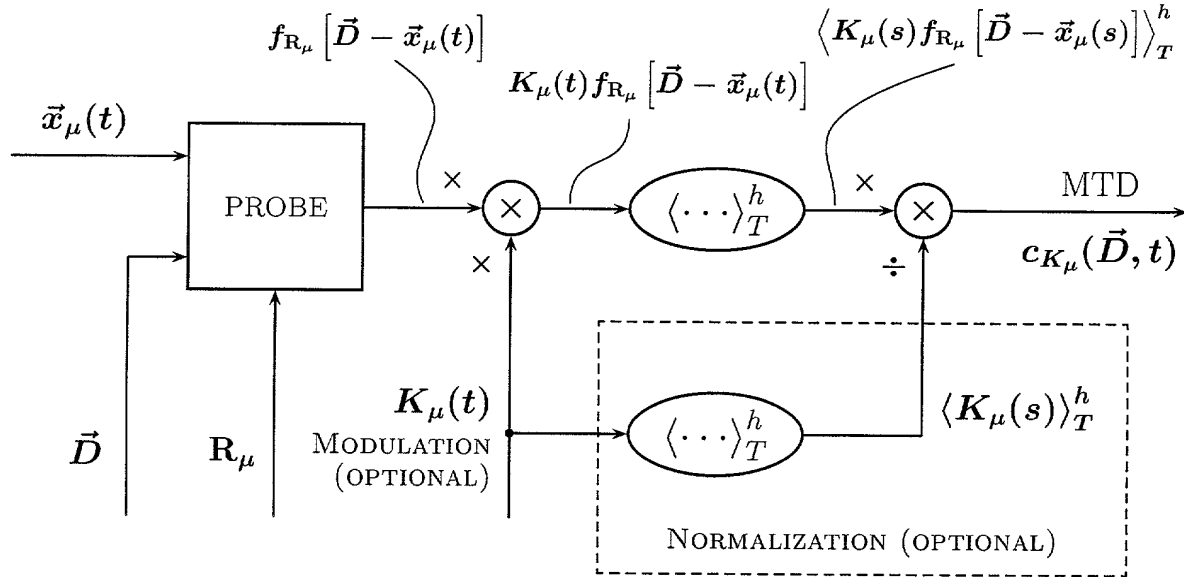


Fig. 6

# MTD FOR SINGLE VARIABLE / COMPONENT OF ENSEMBLE



ACQUISITION SYSTEM: MEASURING DEVICE (PROBE)

HAS INPUT-OUTPUT CHARACTERISTIC OF DIFFERENTIAL DISCRIMINATOR.

$\vec{x}_\mu(t)$  IS INPUT VARIABLE, SCALAR OR VECTOR, OR COMPONENT OF ENSEMBLE.

E.G., SURFACE (IMAGE) GIVEN BY MATRIX CAN BE VIEWED AS DISCRETE ENSEMBLE.

$\vec{D}$  AND  $R_\mu$  ARE PARAMETERS OF PROBE.  $\vec{D}$  IS ANOTHER VARIABLE (NORMALLY OF SAME NATURE AS INPUT VARIABLE), SERVING AS UNIT, OR DATUM.  $R_\mu$  IS WIDTH, OR RESOLUTION, PARAMETER.

$K_\mu(t)$  IS MODULATING VARIABLE, GENERALLY OF DIFFERENT NATURE THAN INPUT VARIABLE. E.G.,  $K_\mu(t) = \text{constant}$  LEADS TO MTD AS AMPLITUDE DENSITY, AND  $K_\mu(t) = |\vec{x}_\mu(t)|$  LEADS TO MTD AS COUNTING DENSITY/RATE.

Fig. 7



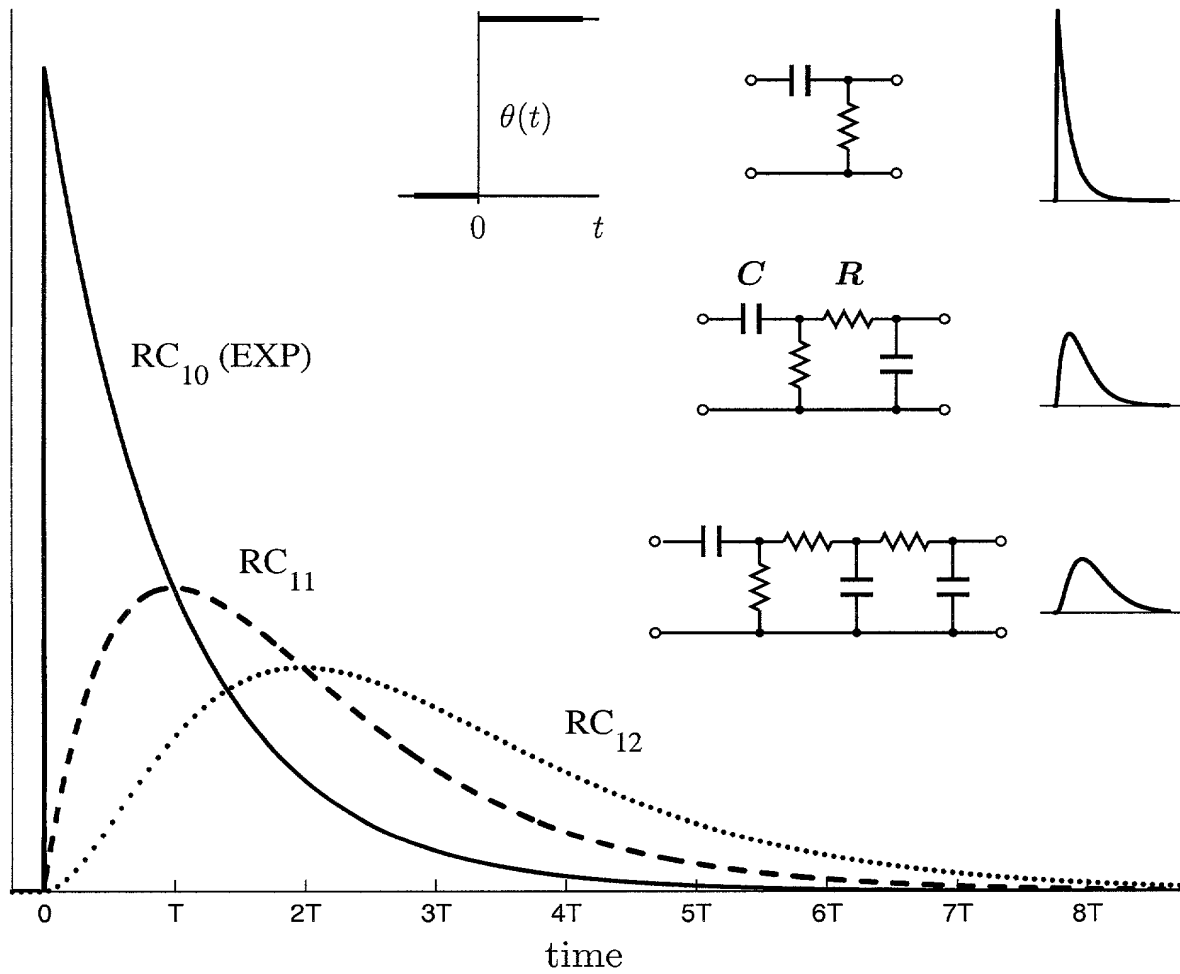


Fig. 8

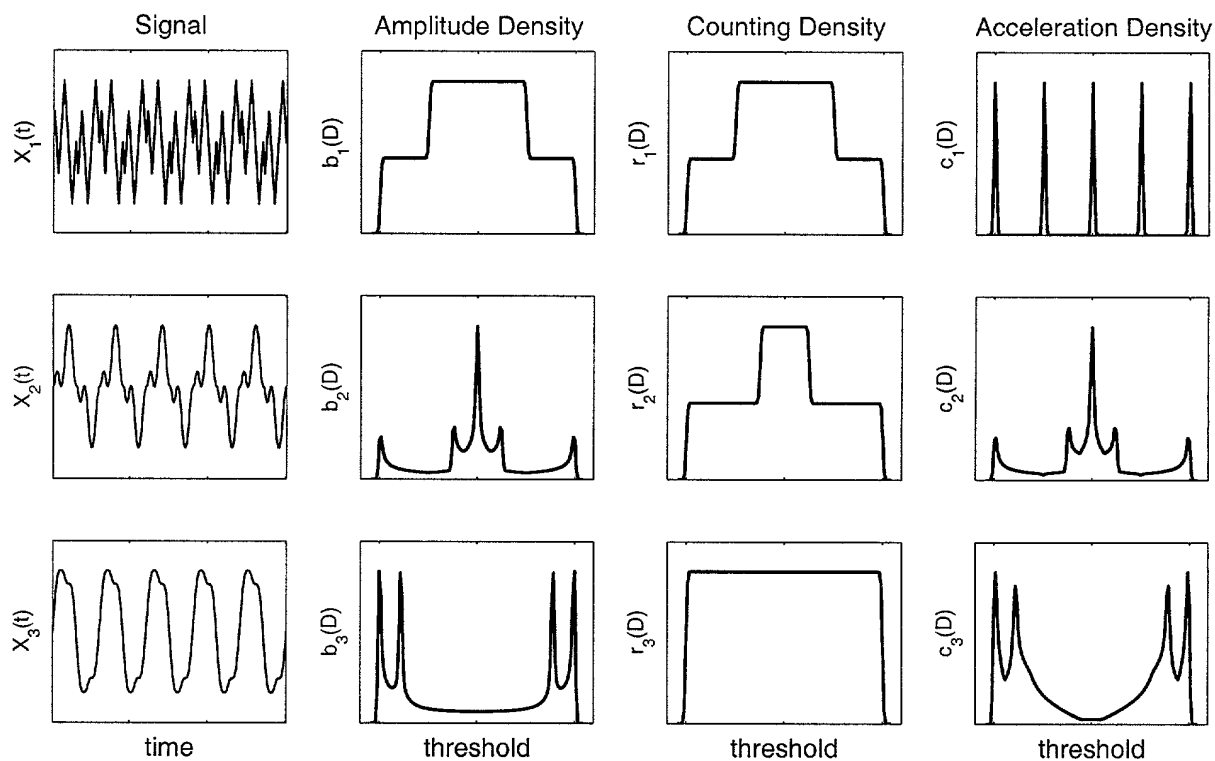


Fig. 9 a

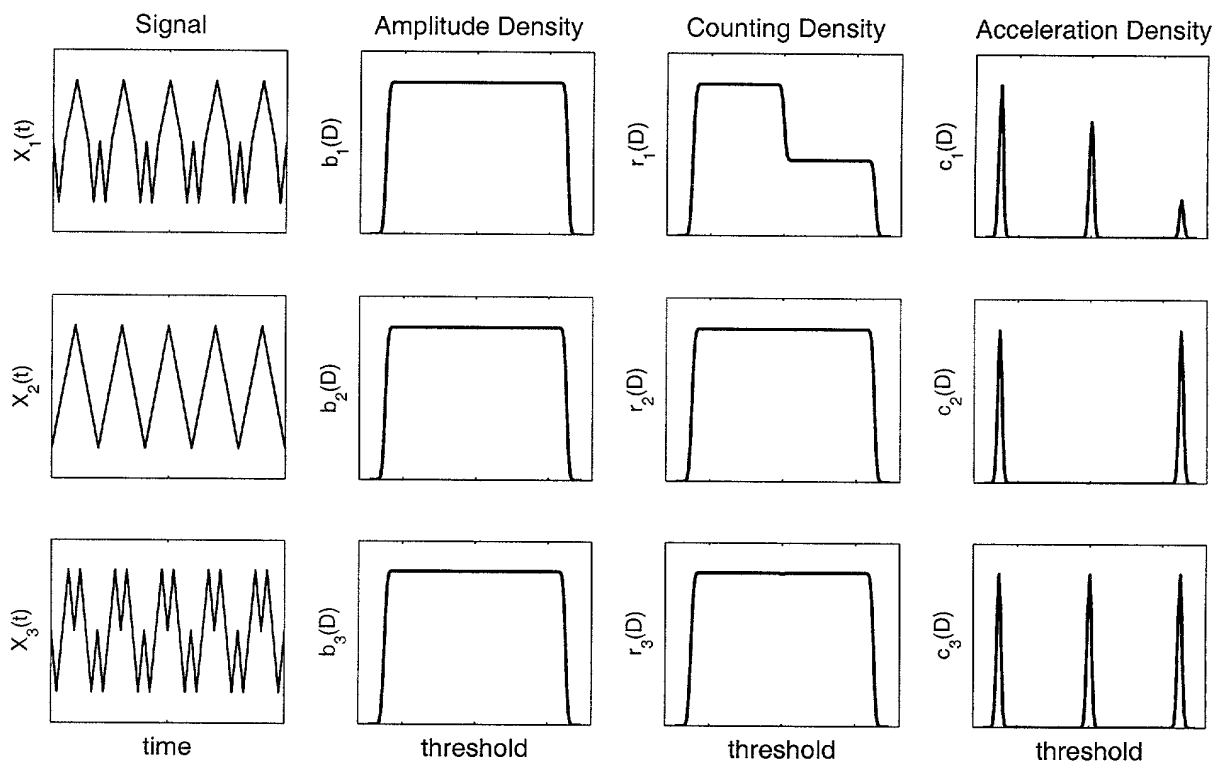


Fig. 9b

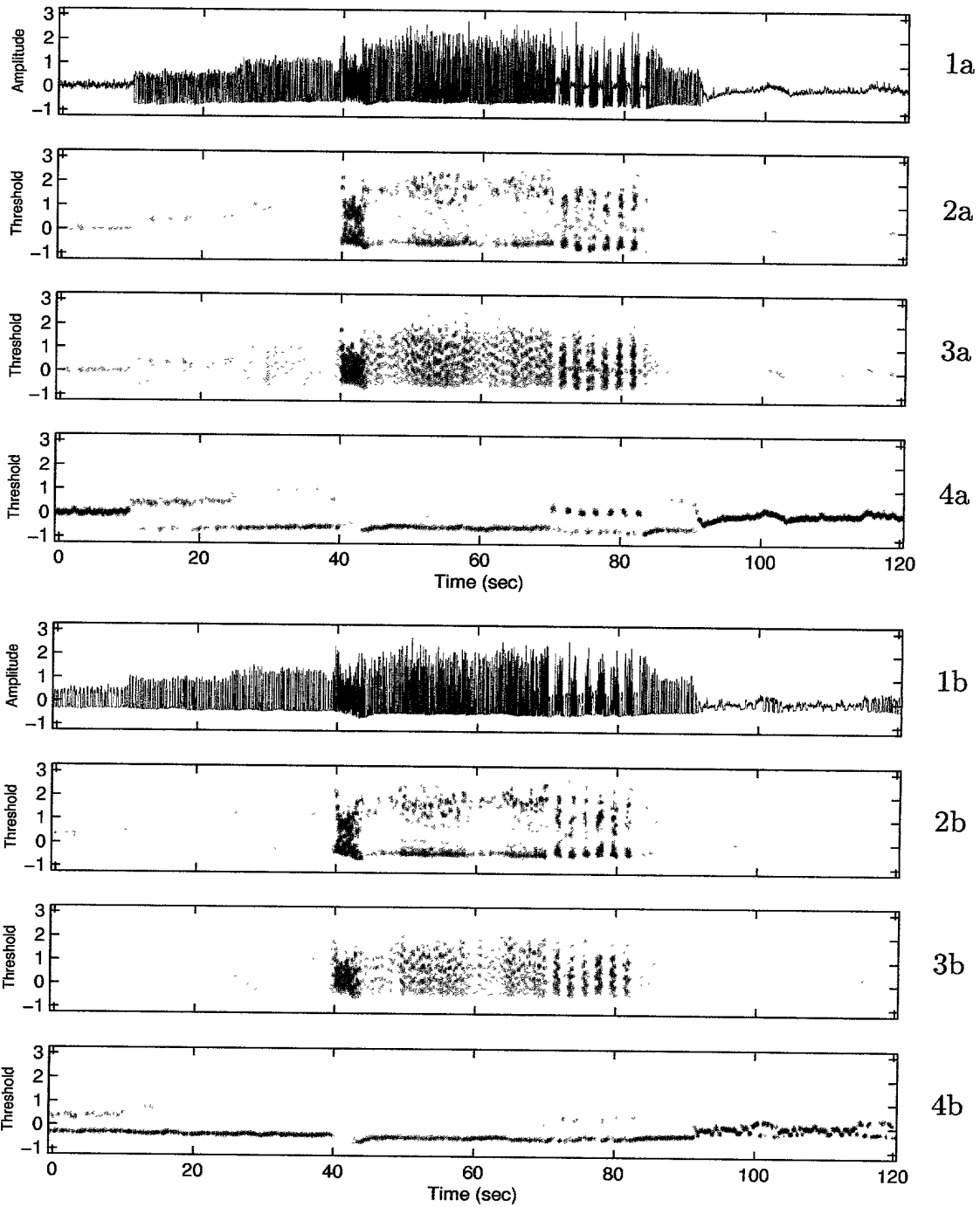


Fig. 10

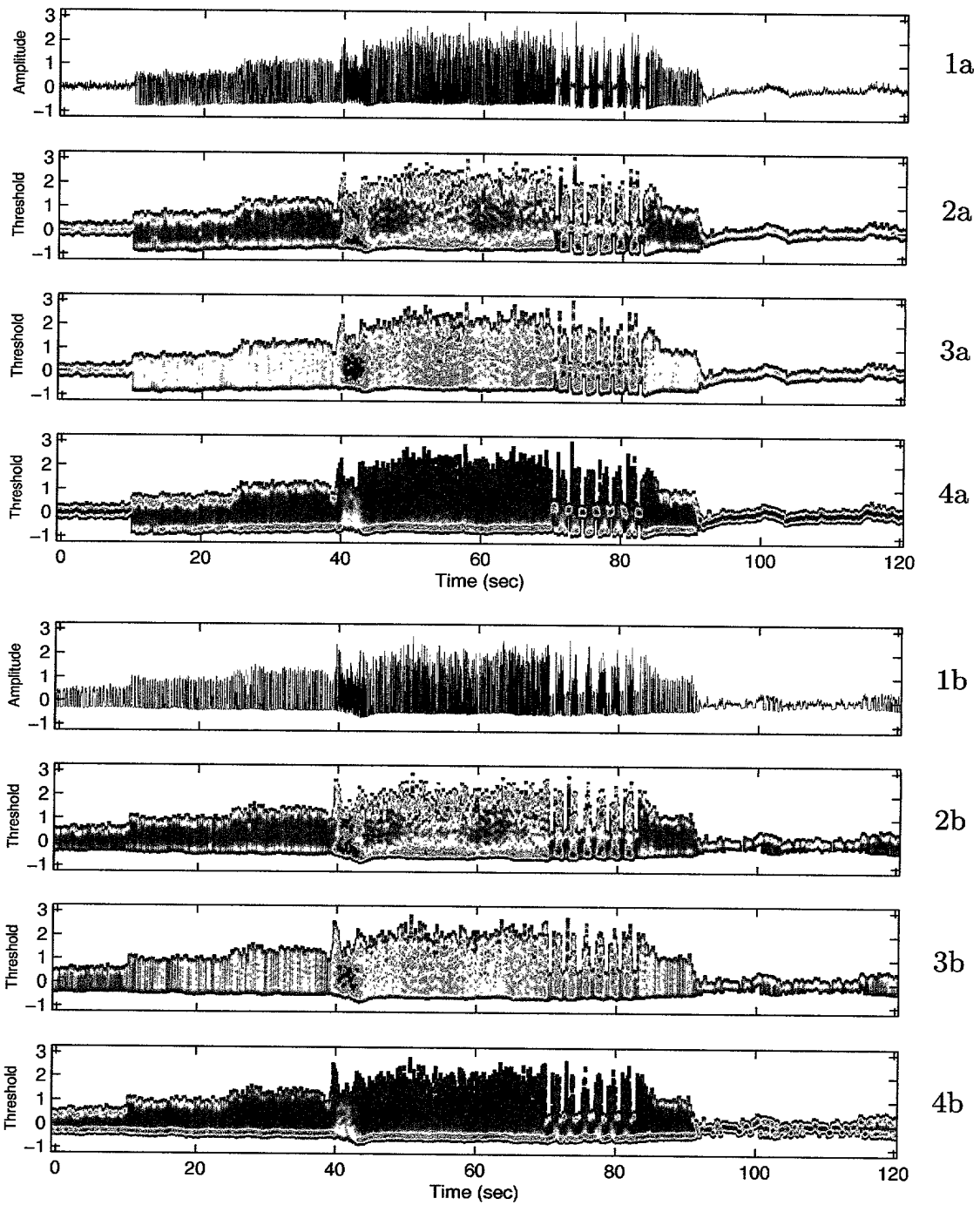


Fig. 10

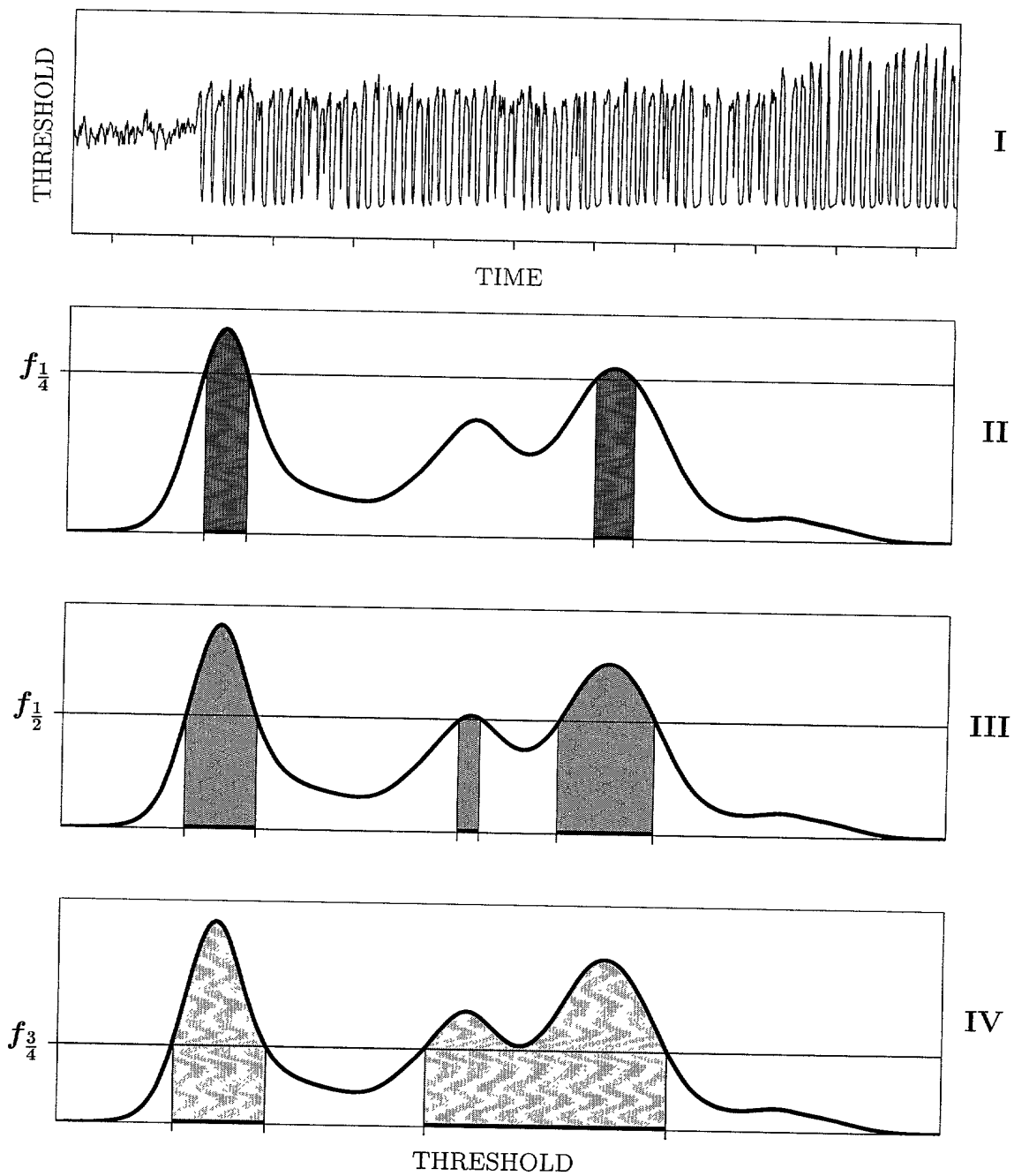


Fig. 11

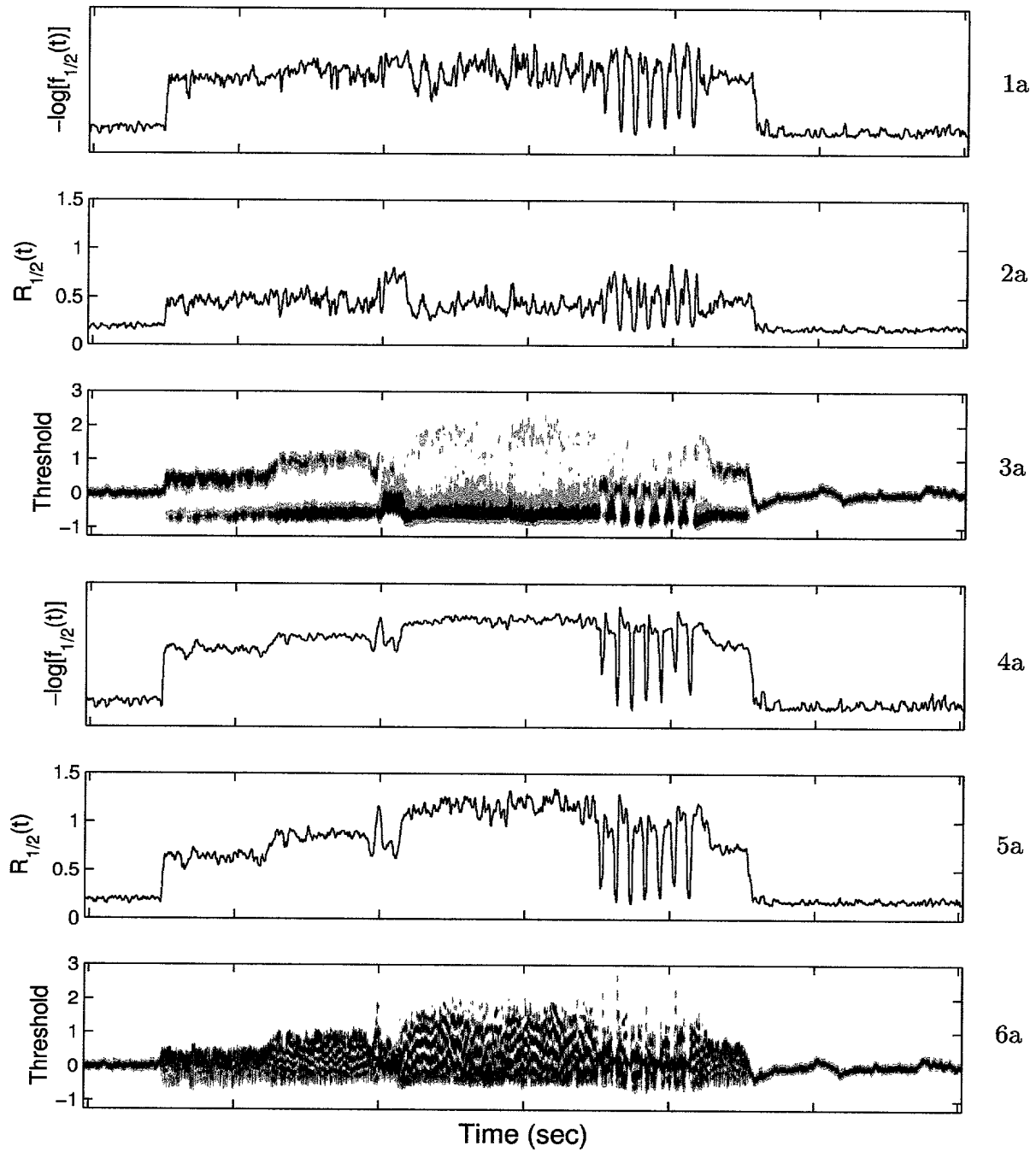


Fig. 12 a

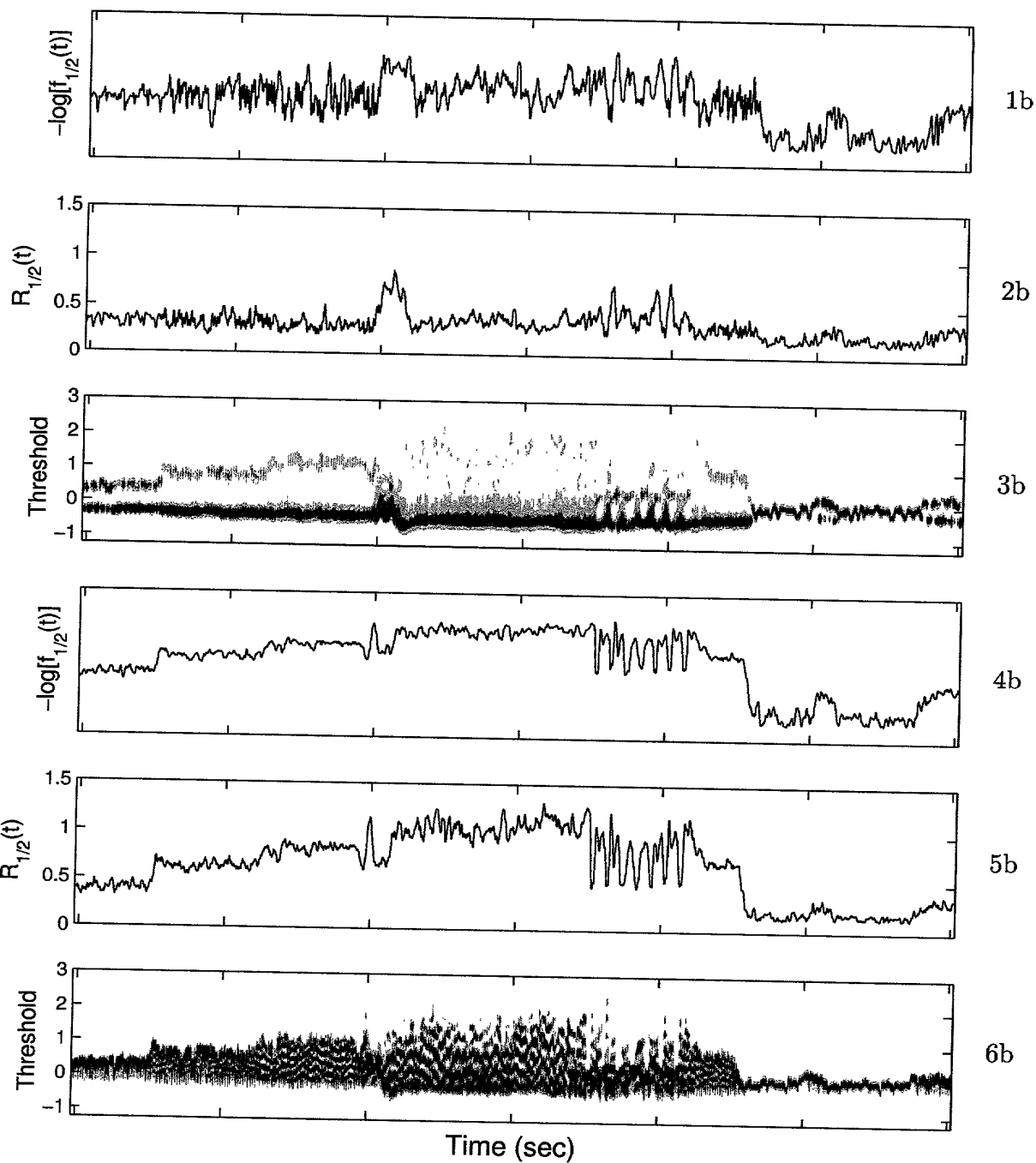


Fig. 12b



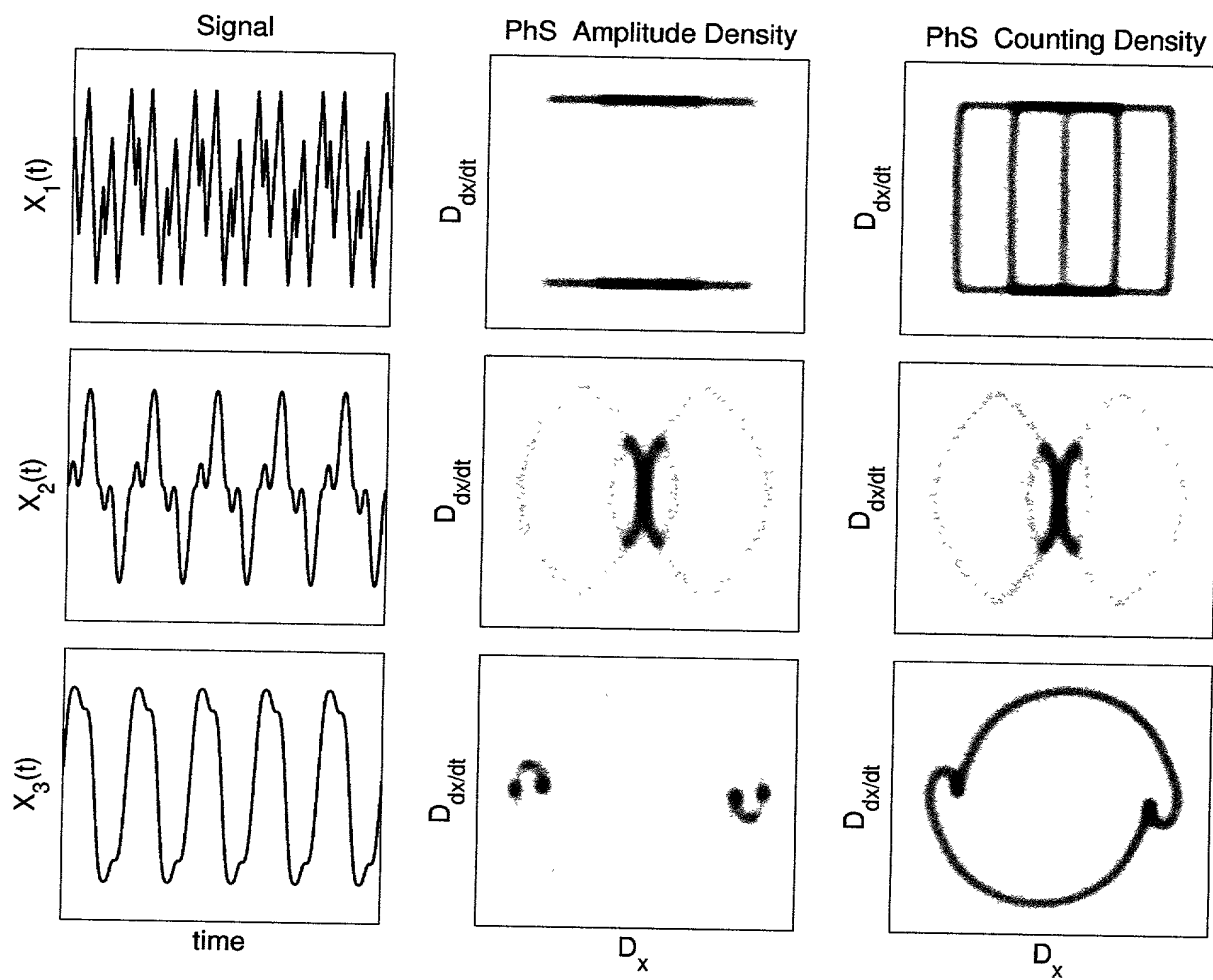


Fig. 13

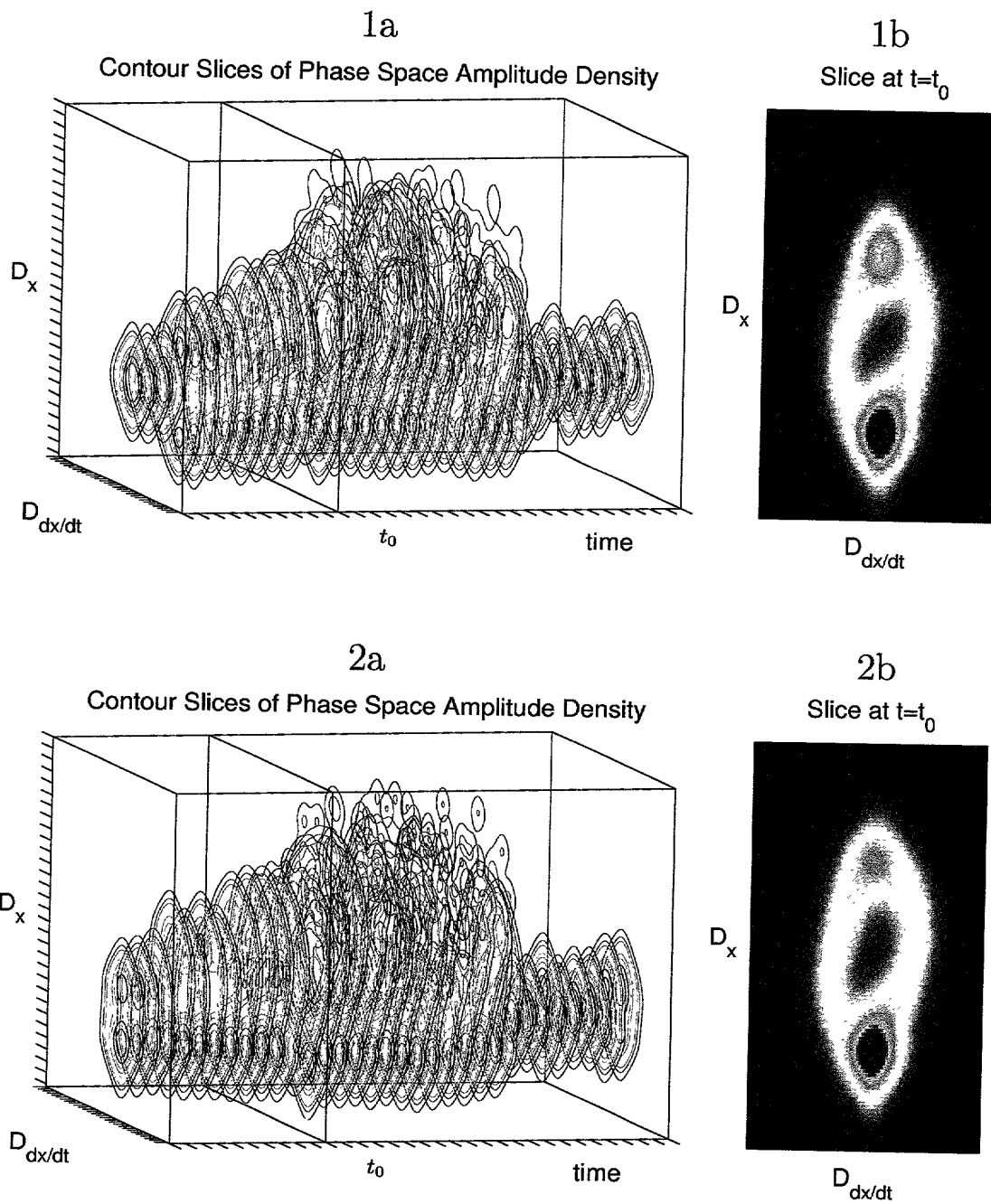


Fig. 14

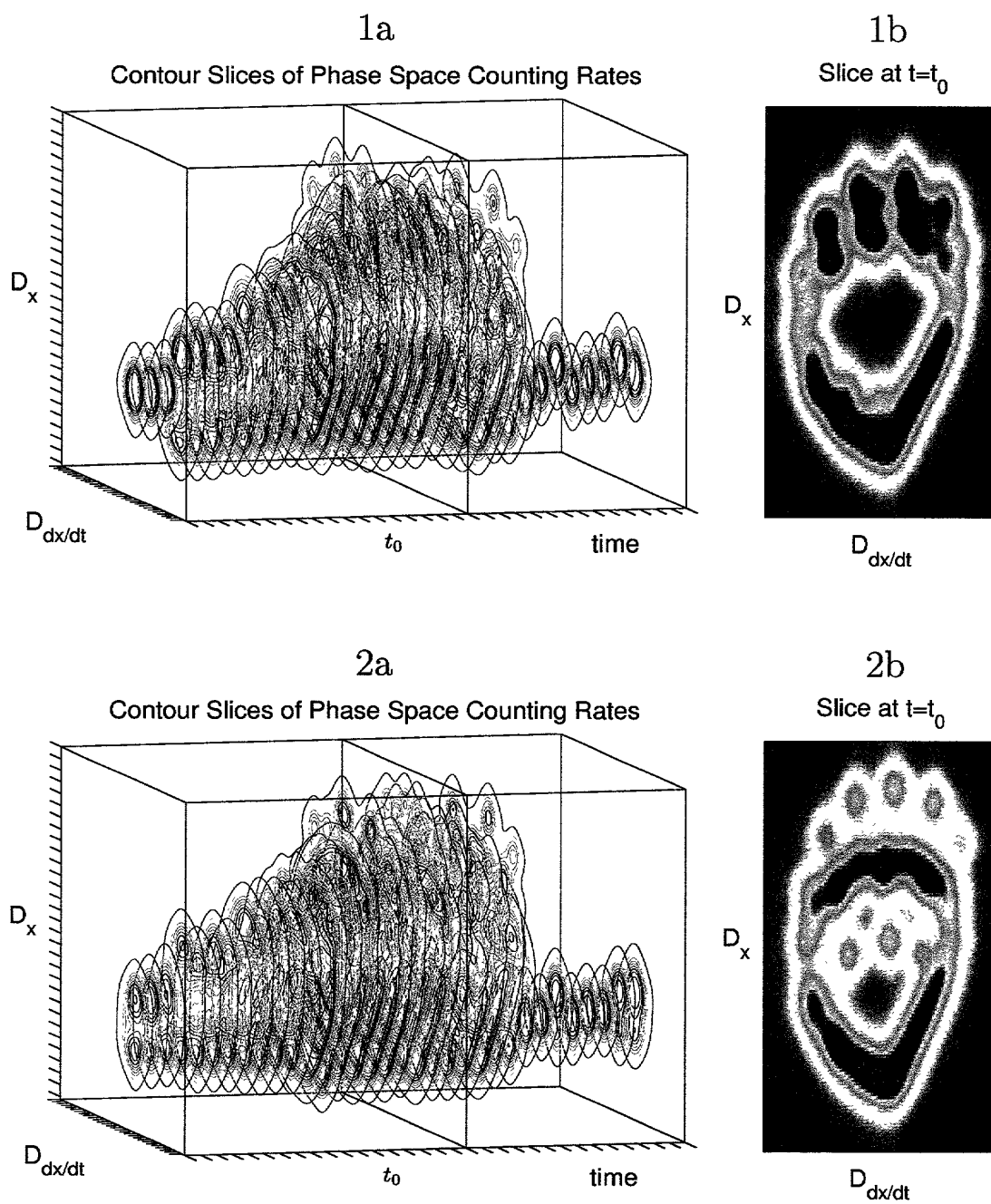


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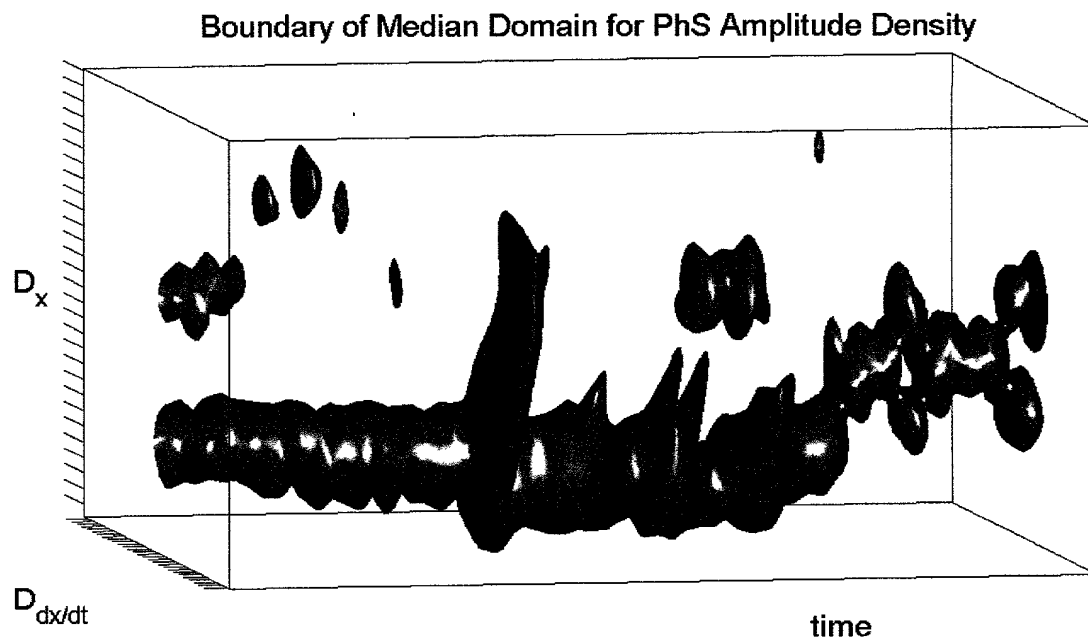
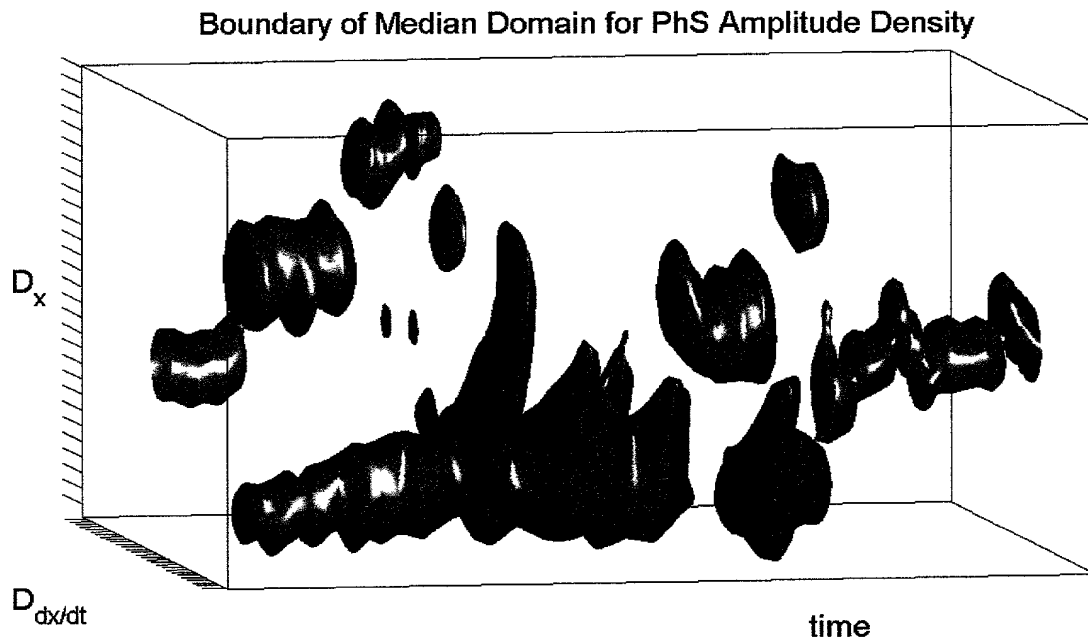
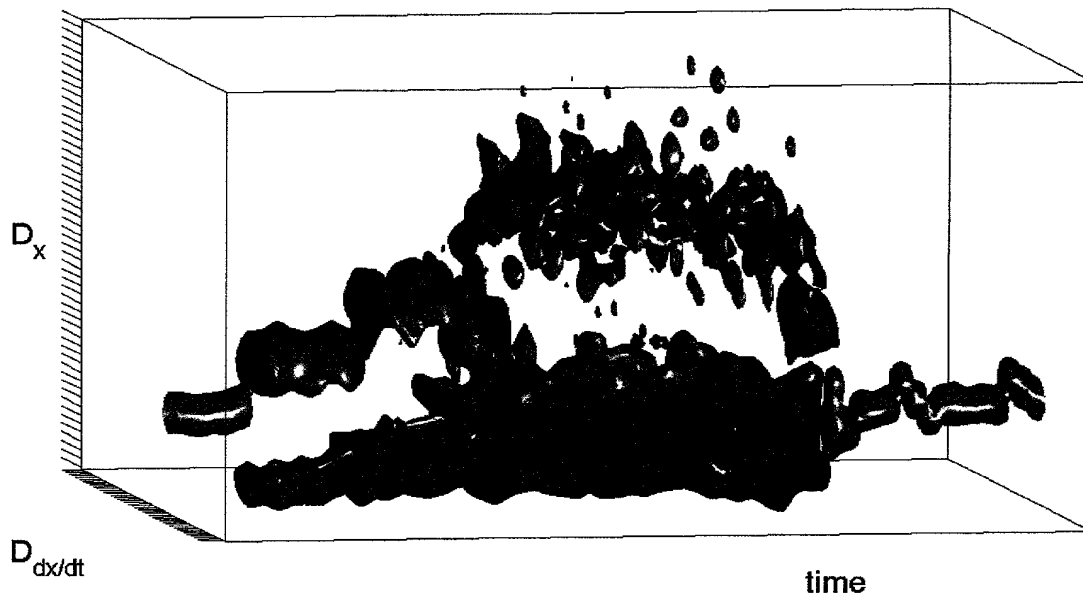


Fig. 16

Boundary of Median Domain for PhS Counting Density



Boundary of Median Domain for PhS Counting Density

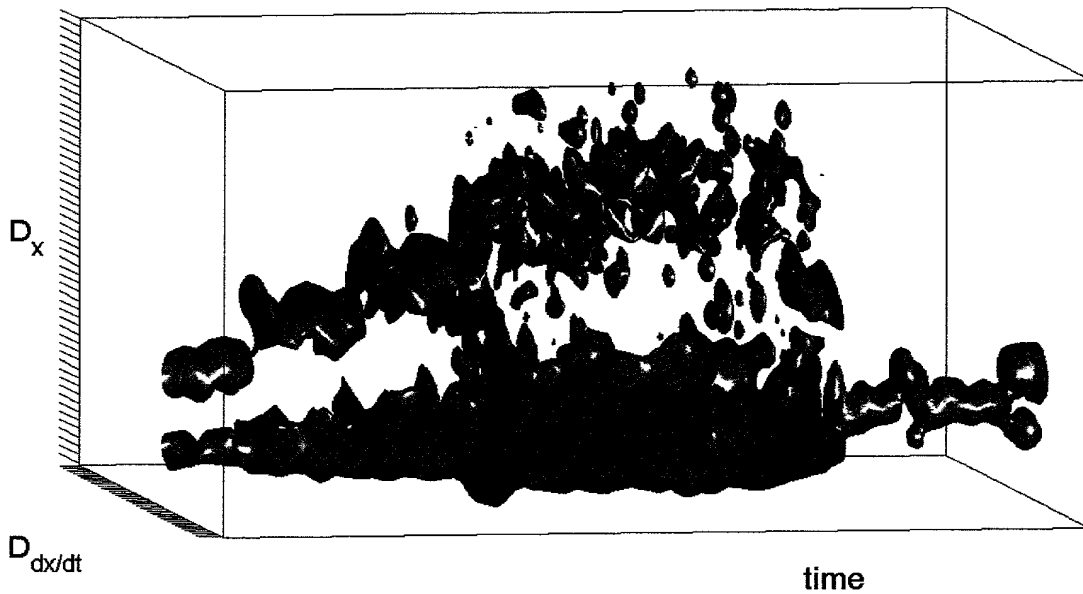


Fig. 17

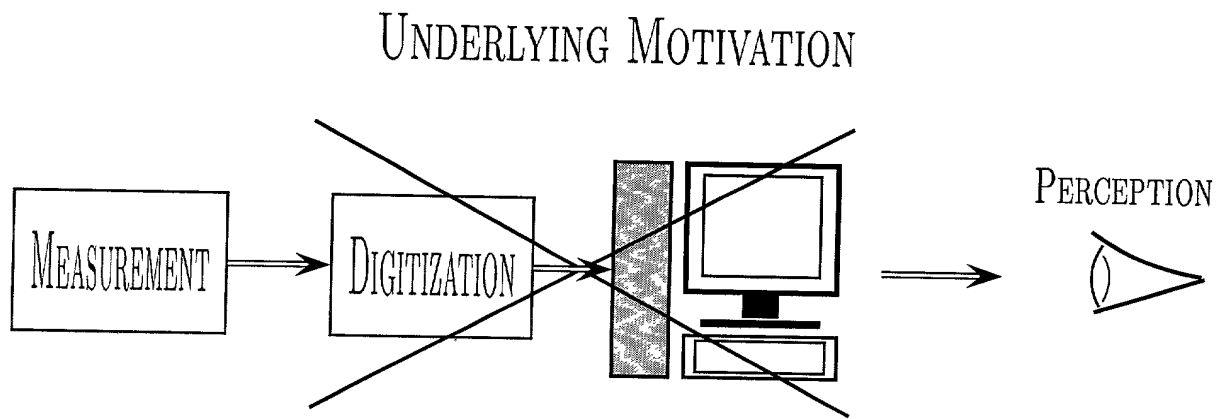


Fig. 18

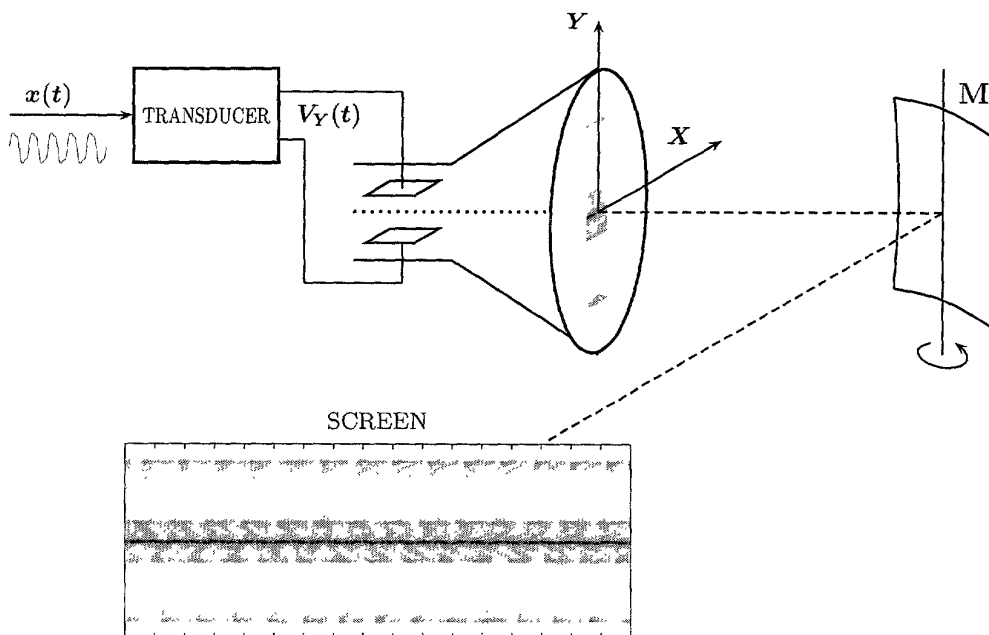


Fig. 19

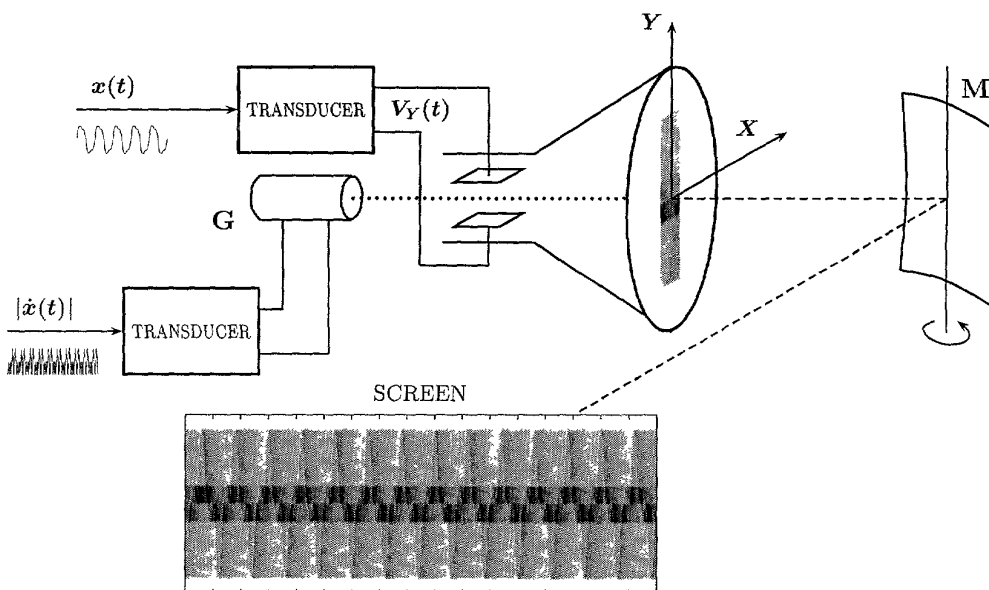


Fig. 20

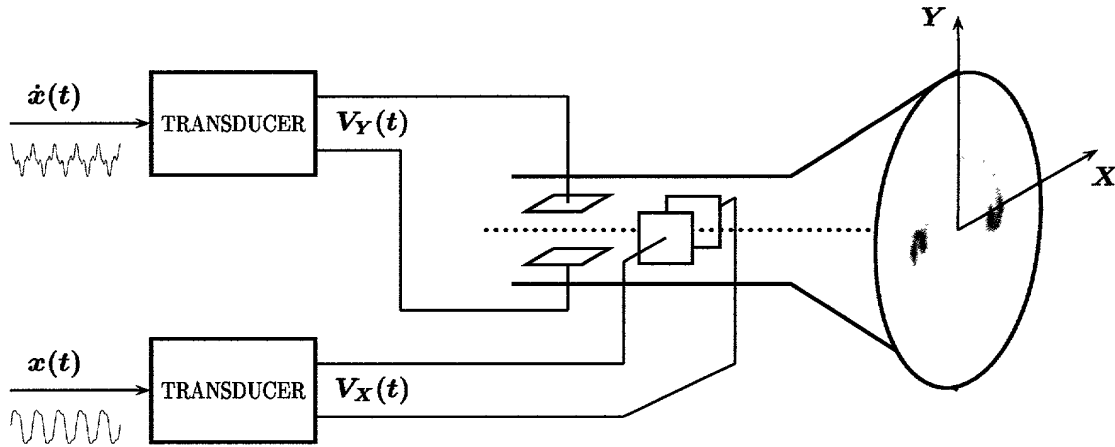


Fig. 21

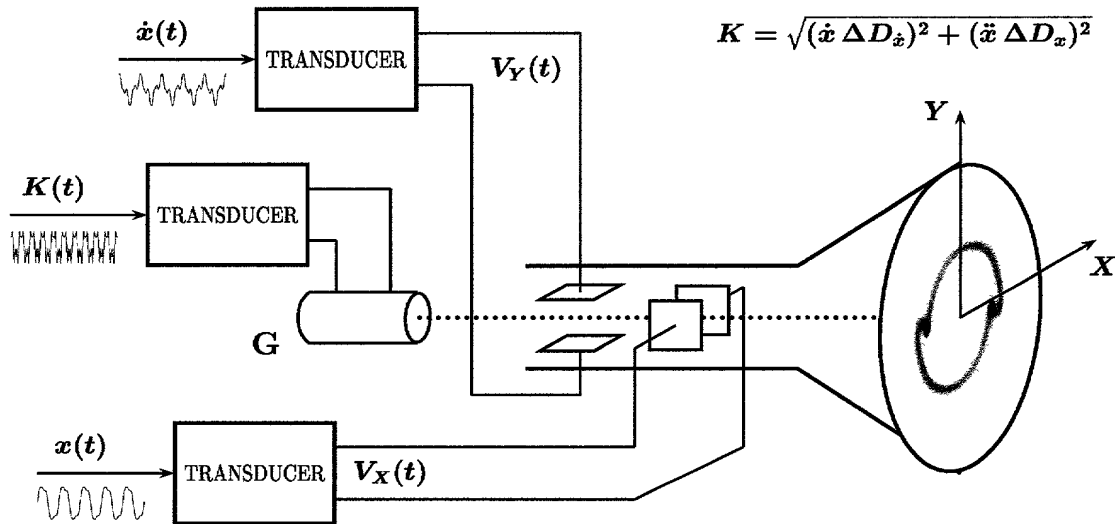


Fig. 22



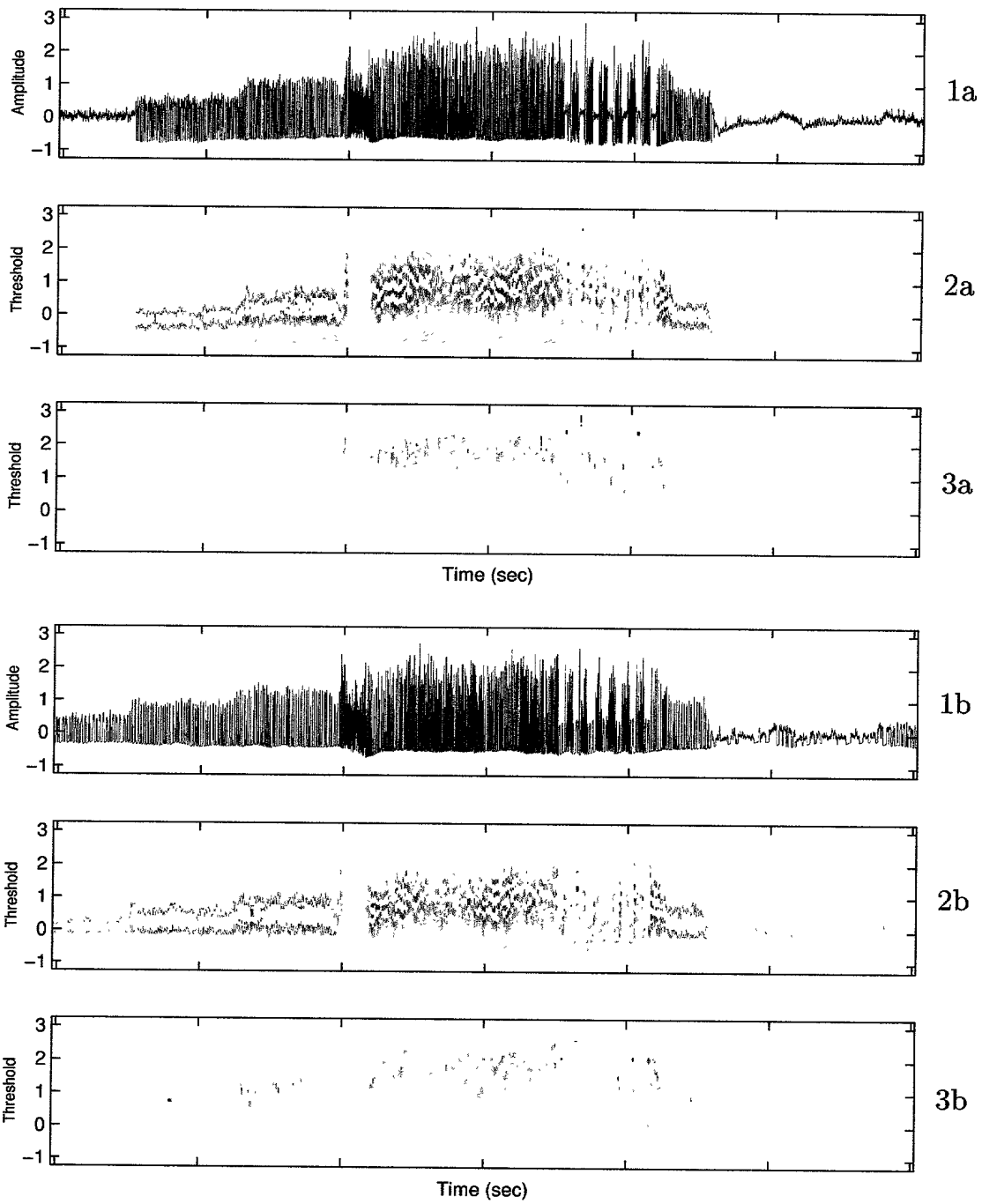


Fig. 23

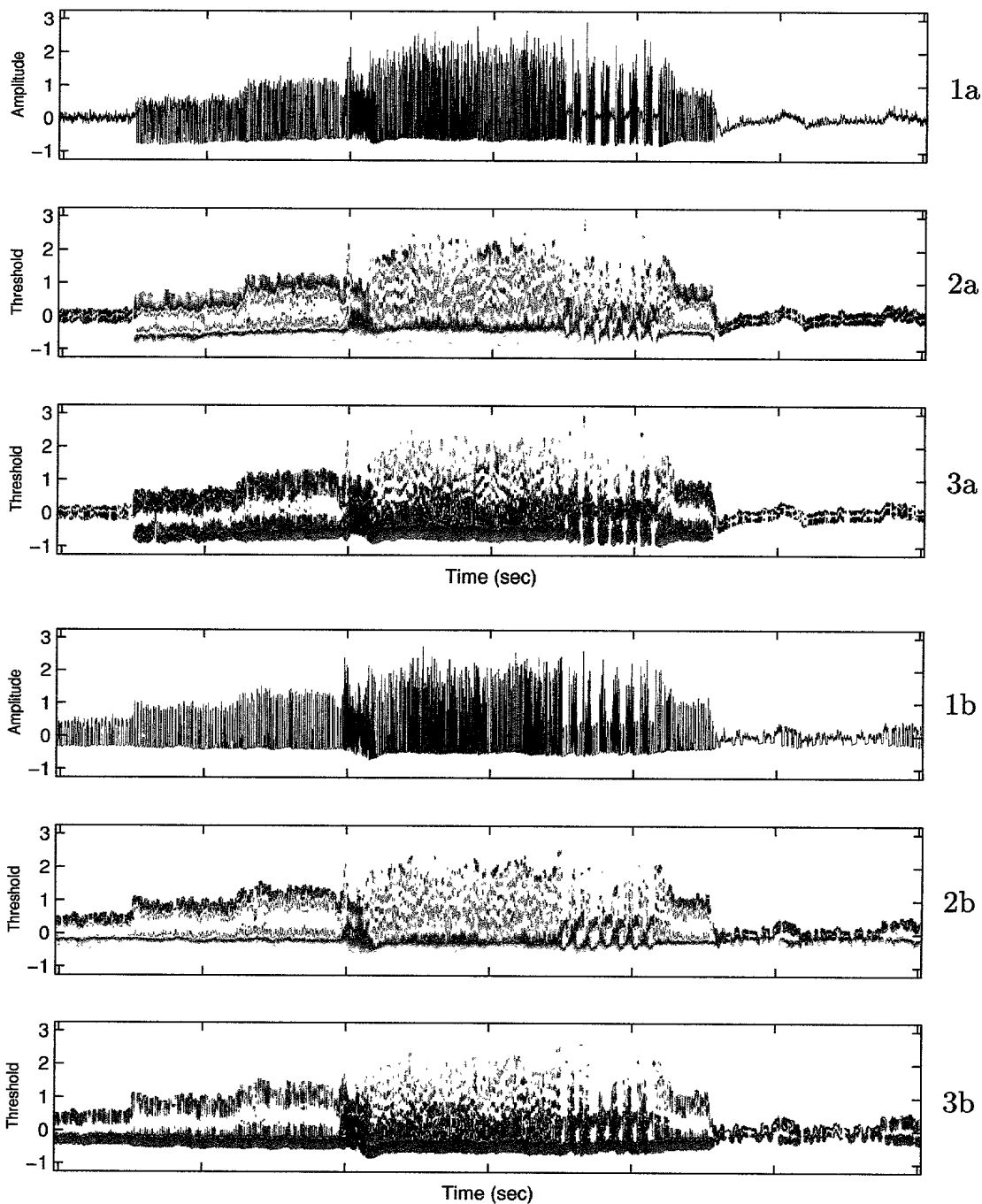


Fig. 23

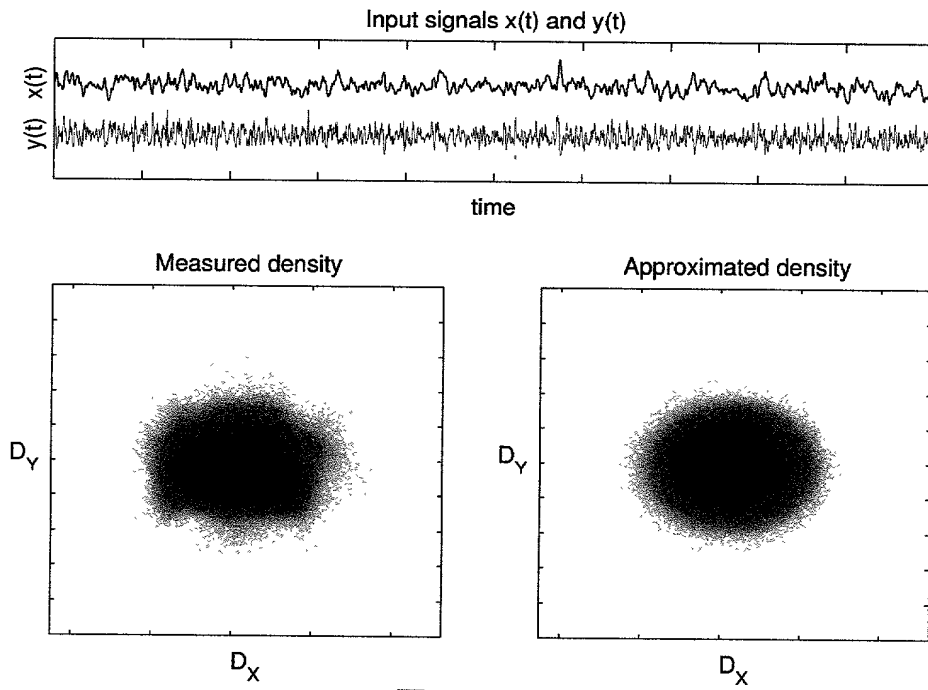


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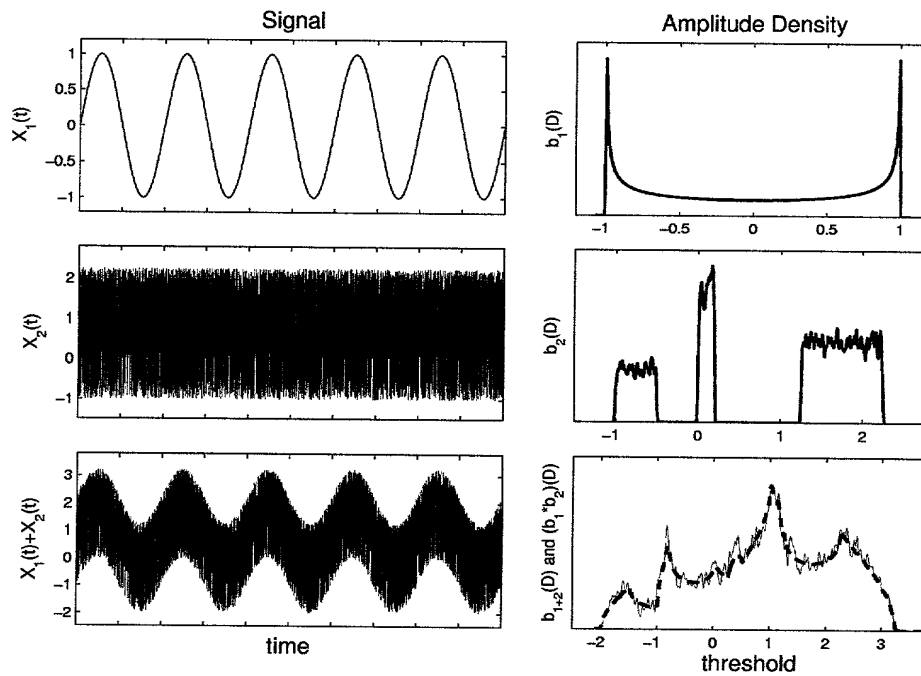


Fig. 25

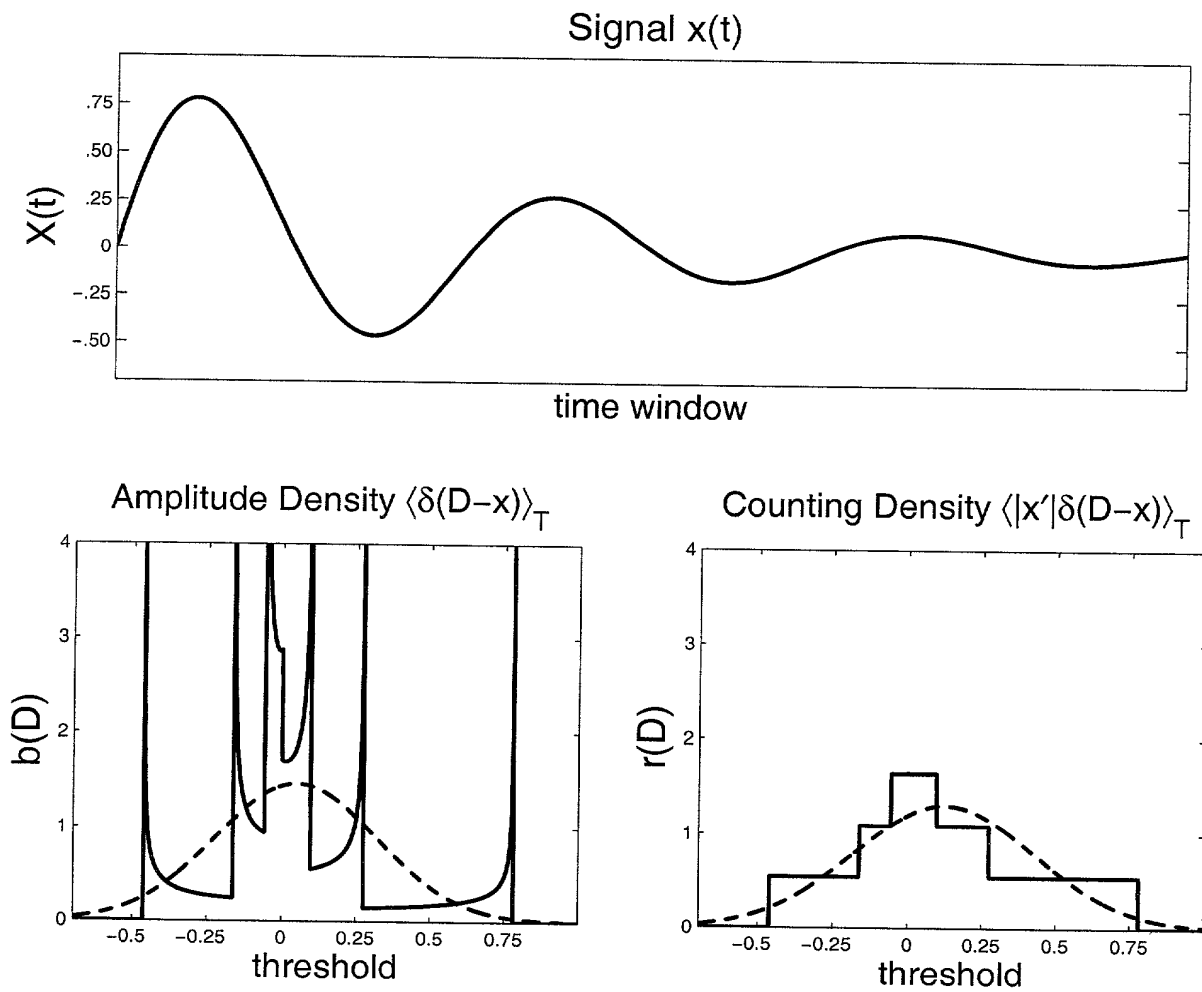


Fig. 26

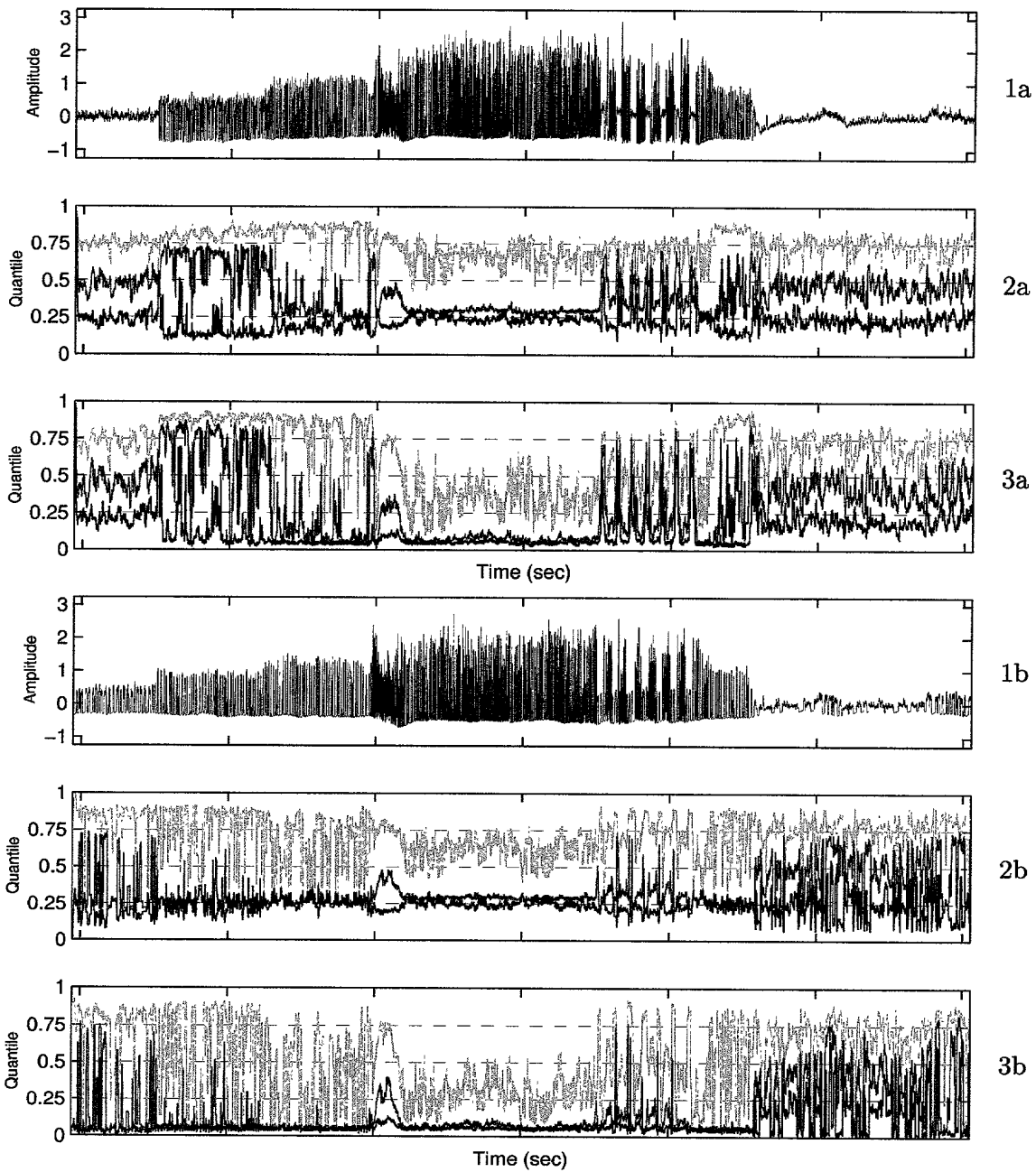


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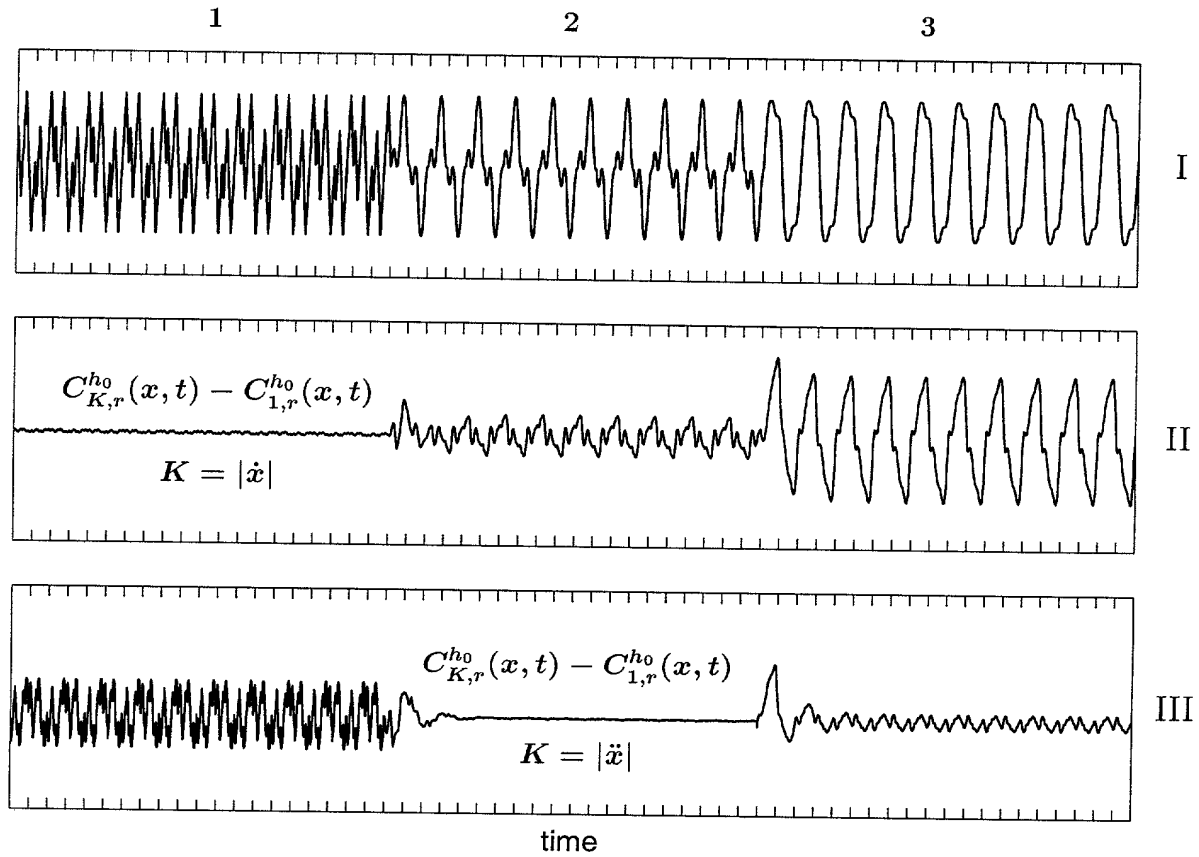


Fig. 28

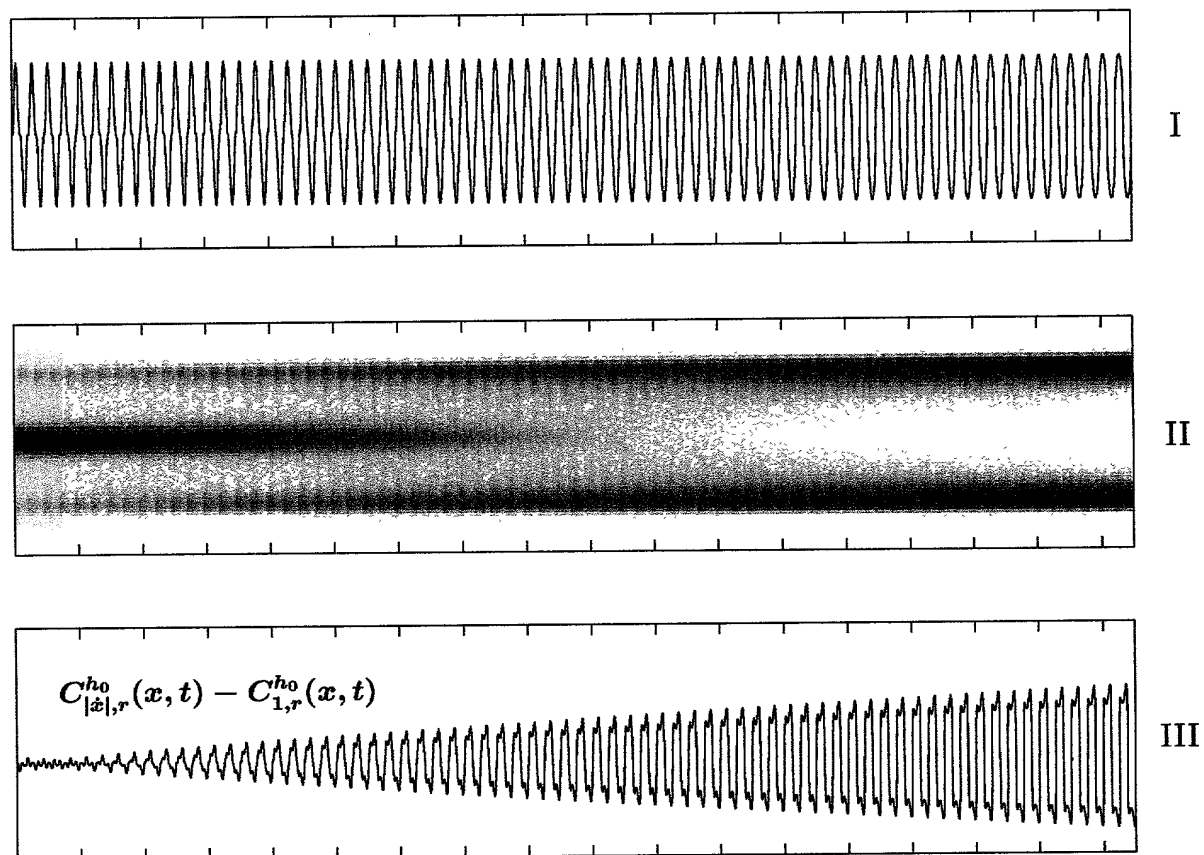


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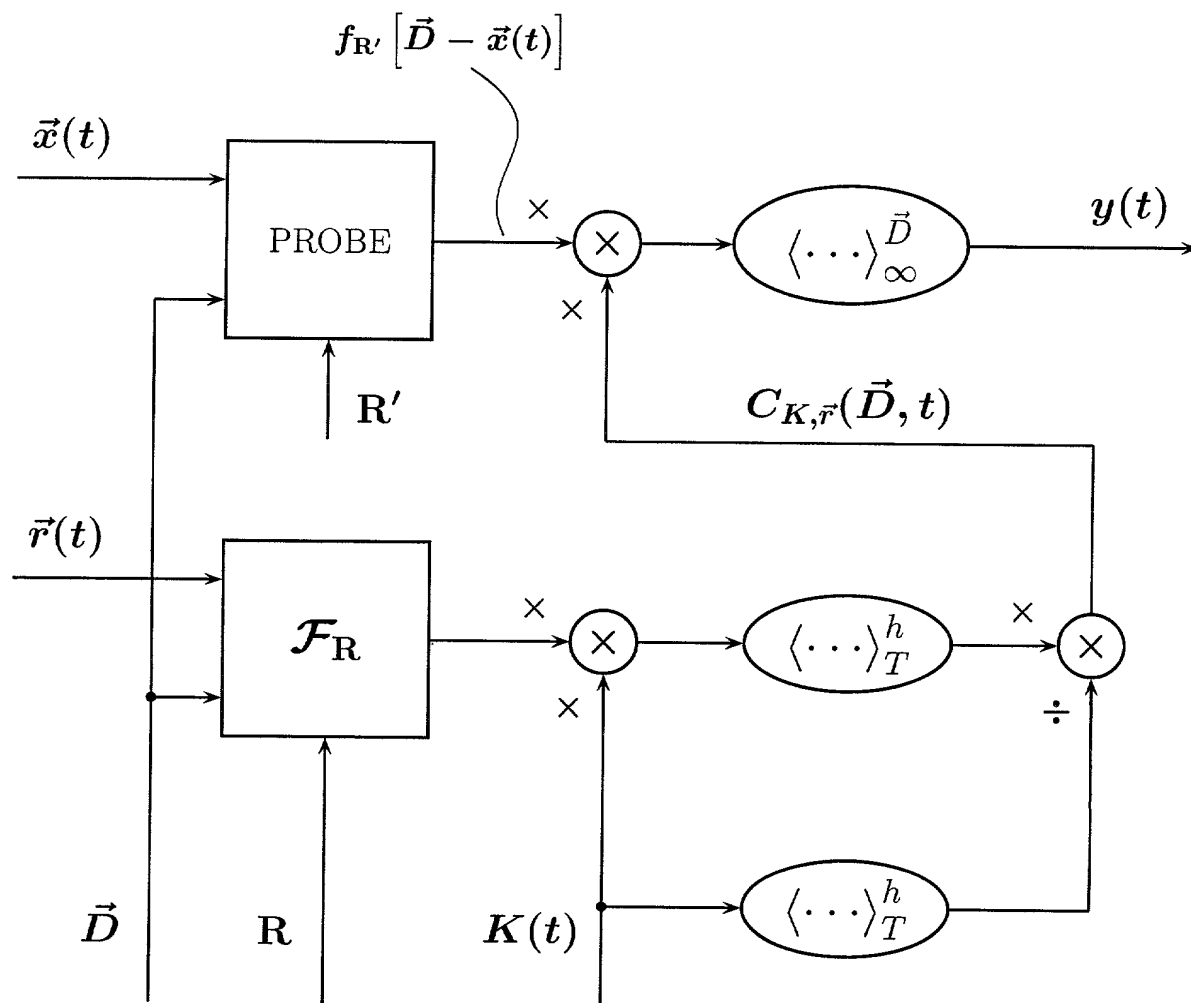


Fig. 30



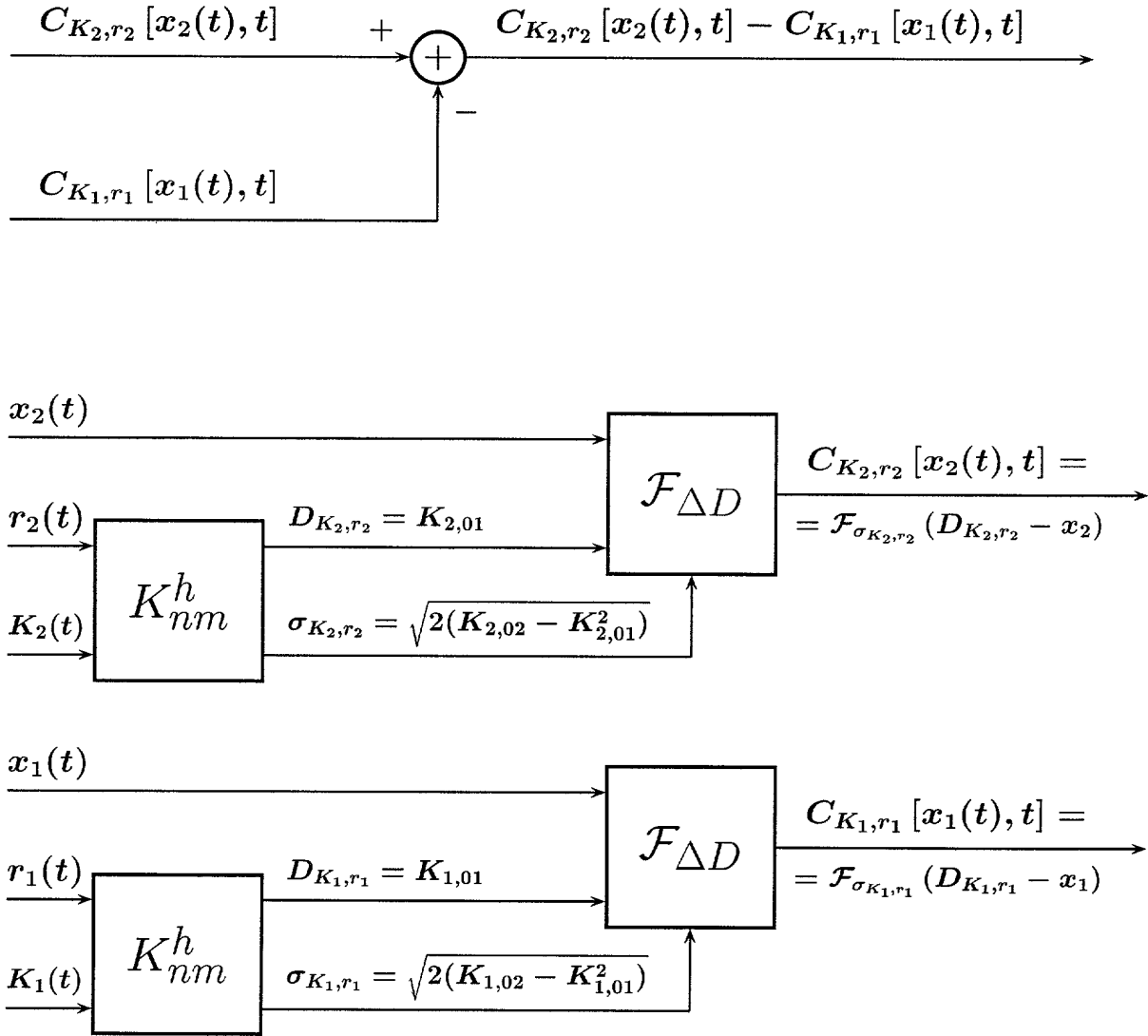


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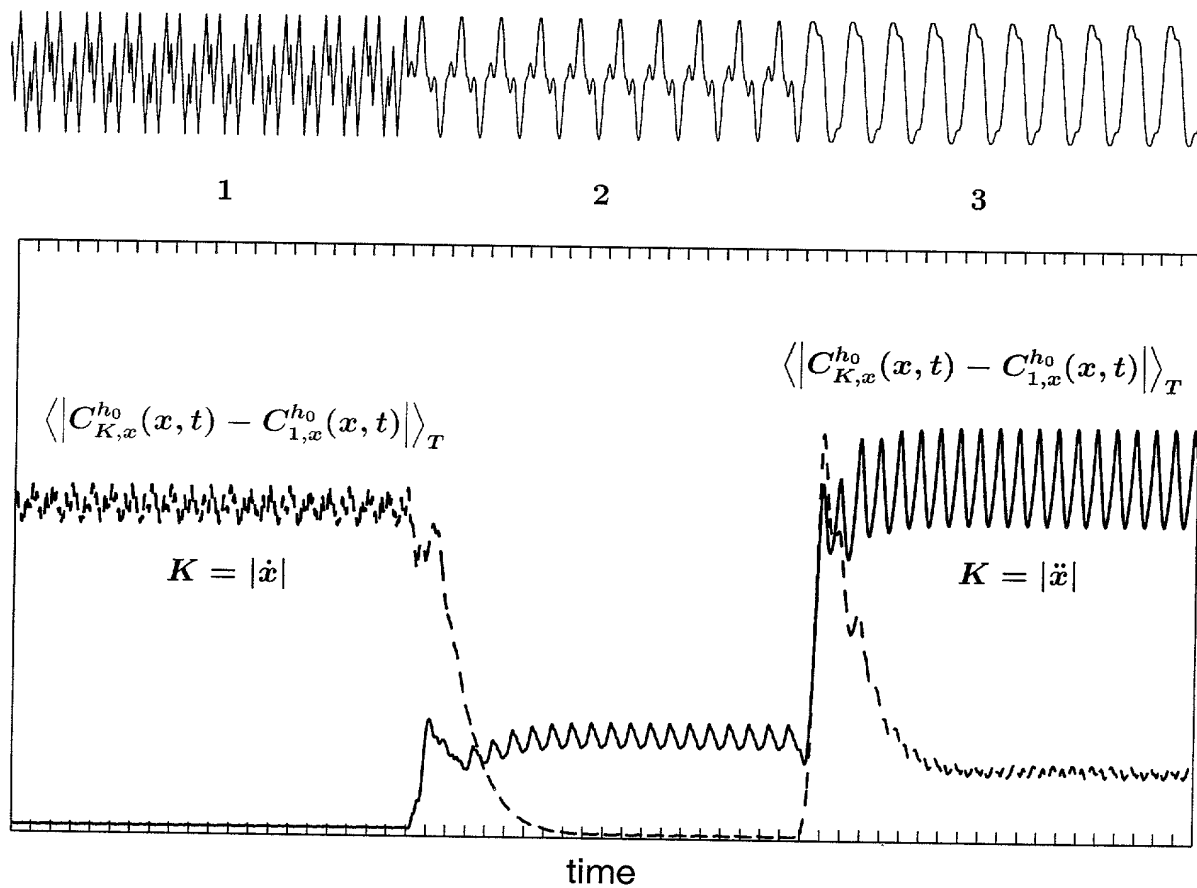


Fig. 32

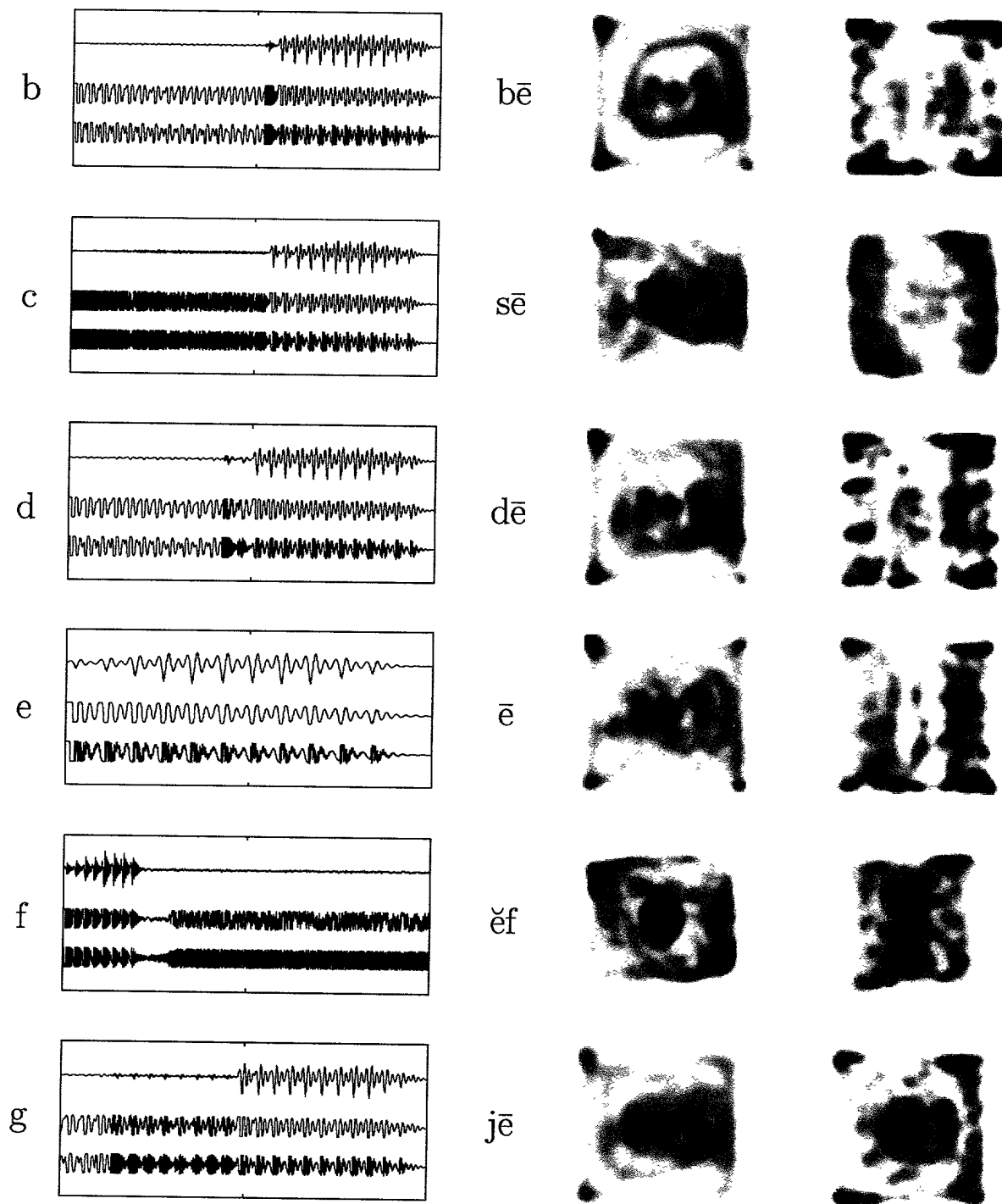


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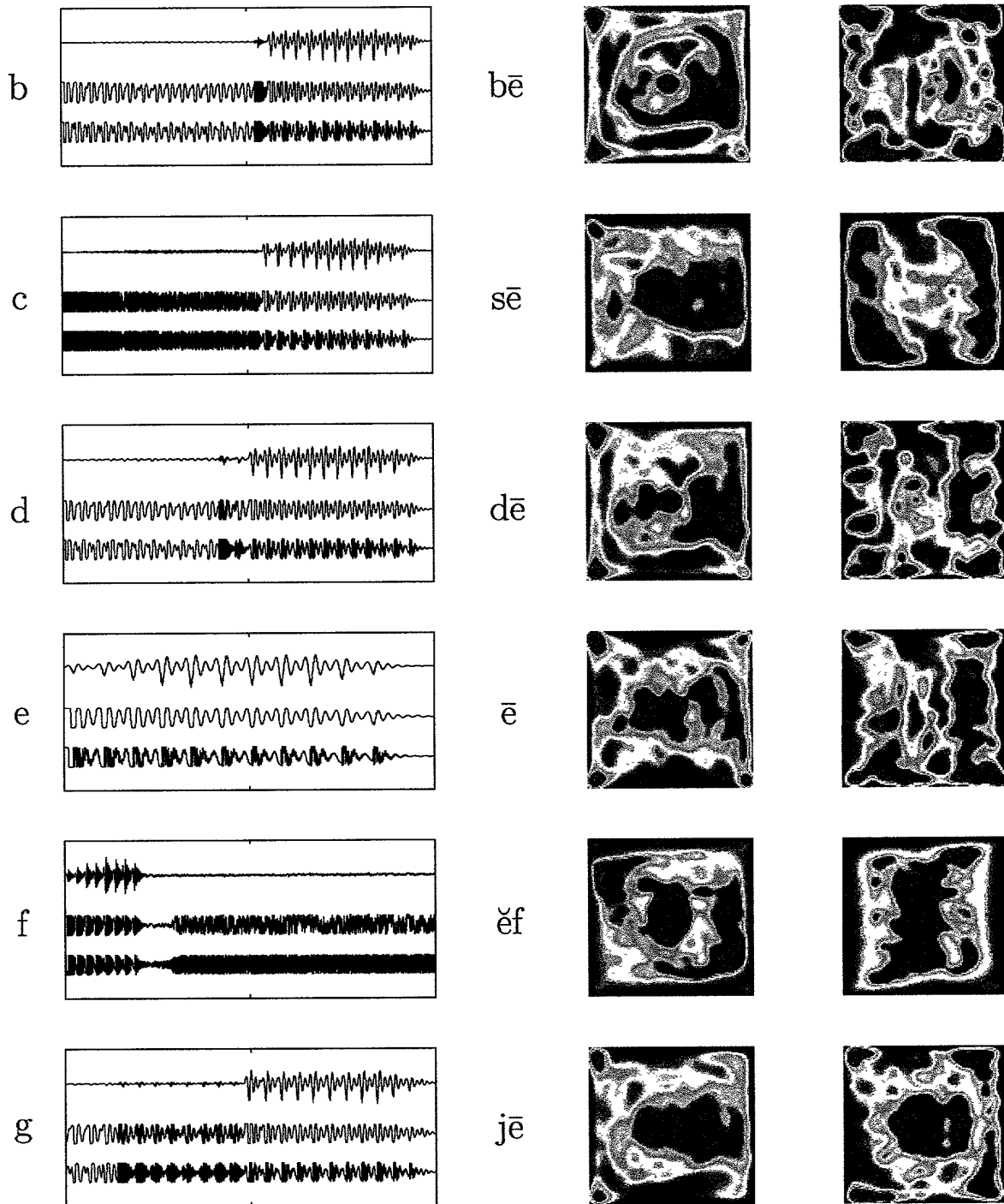


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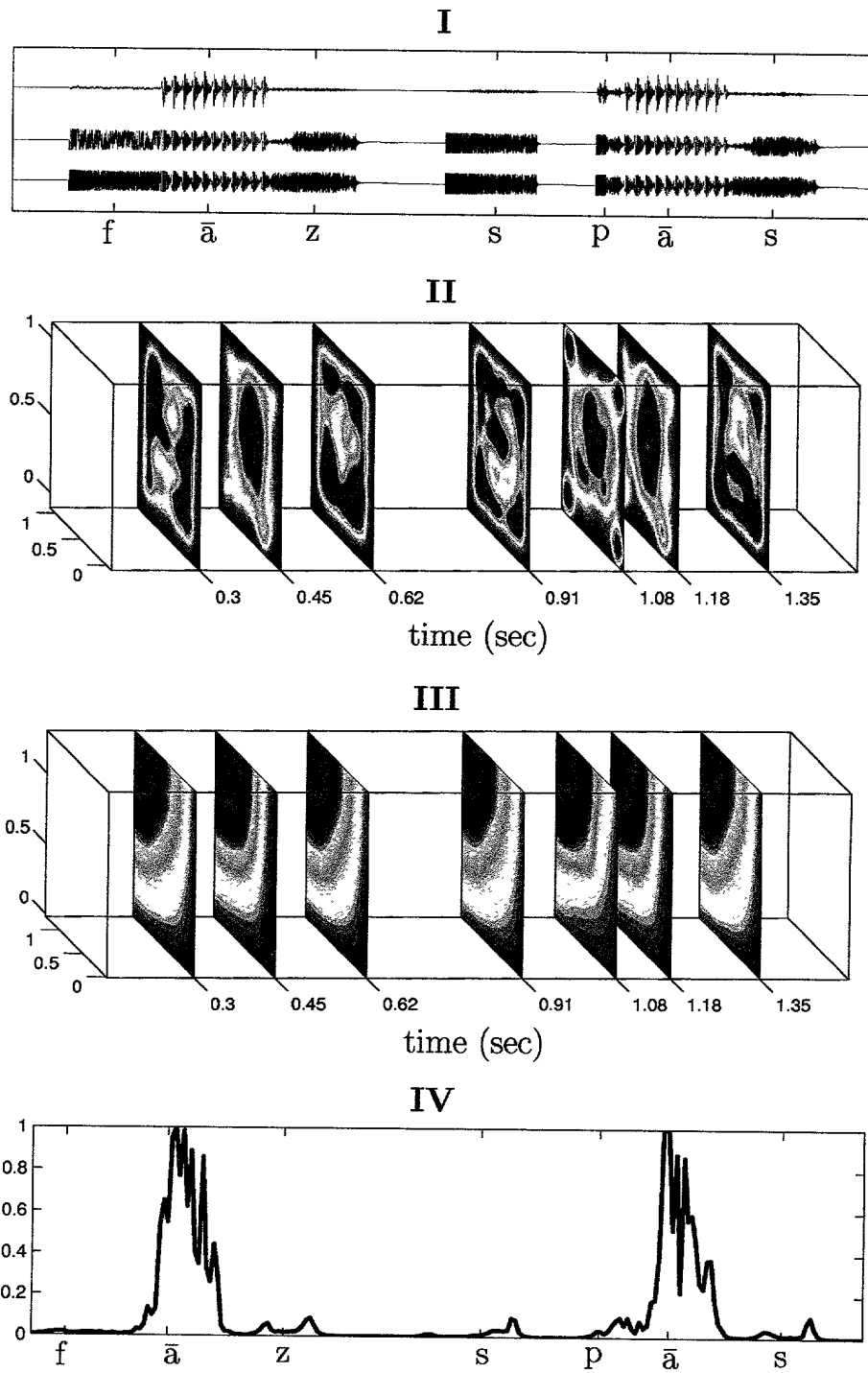


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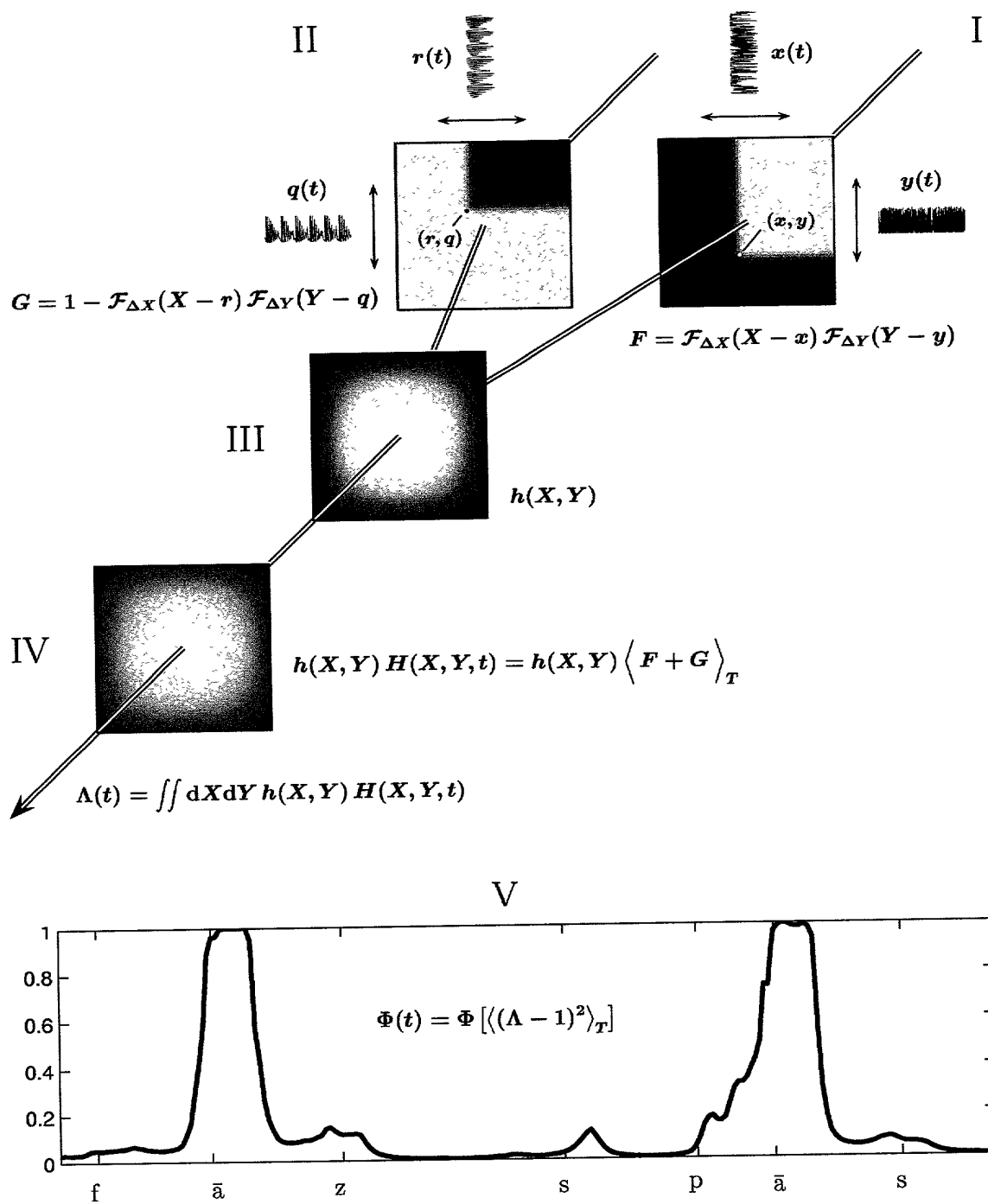


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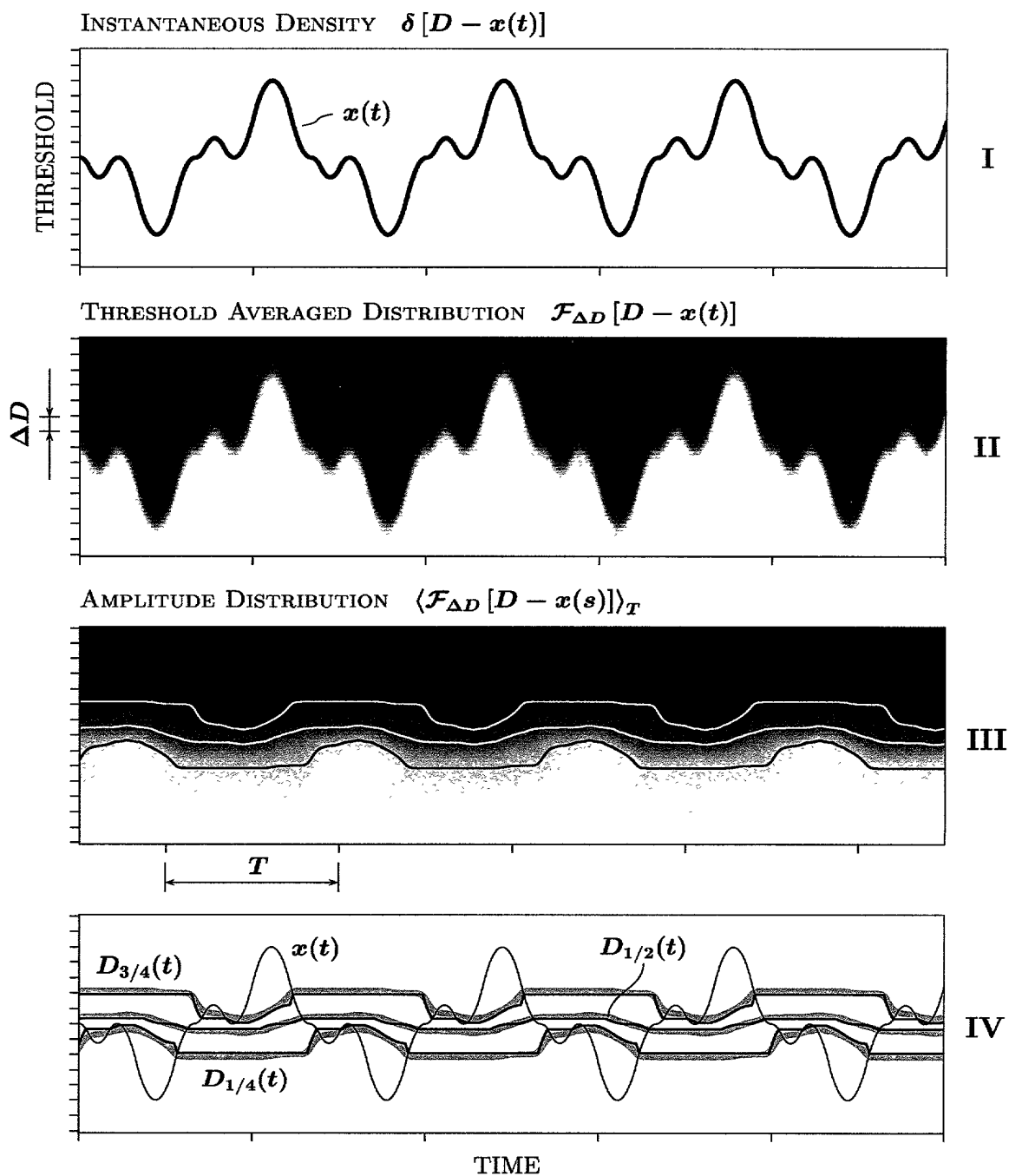


Fig. 36

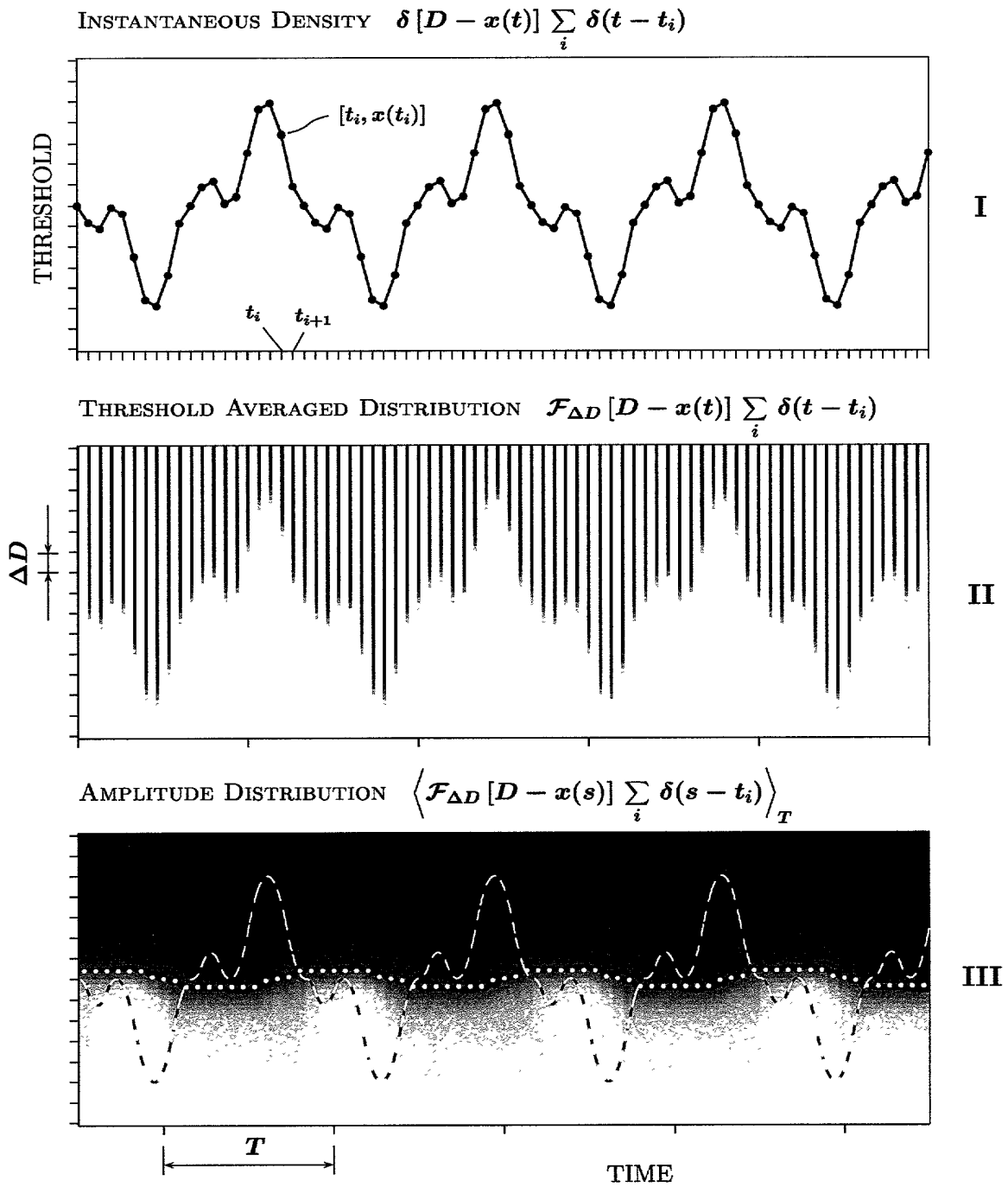
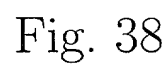


Fig. 37





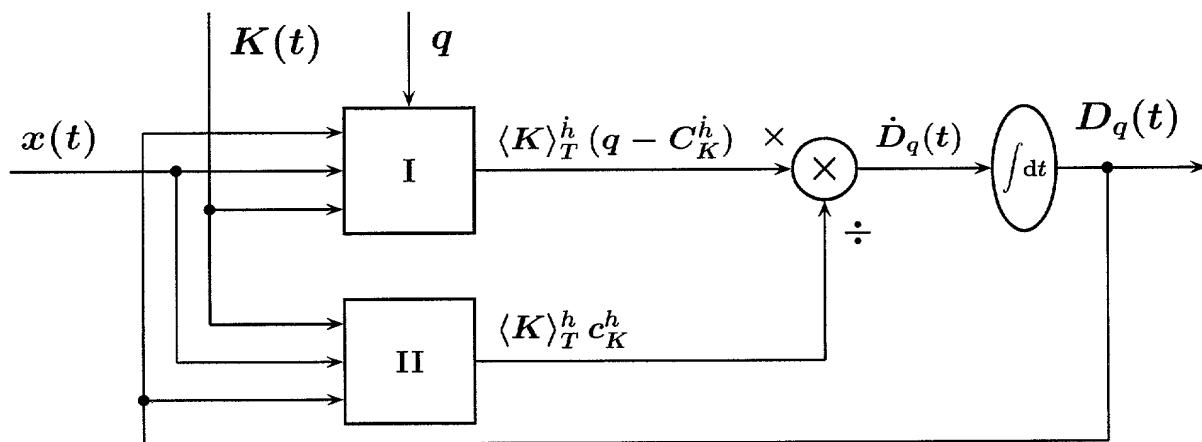


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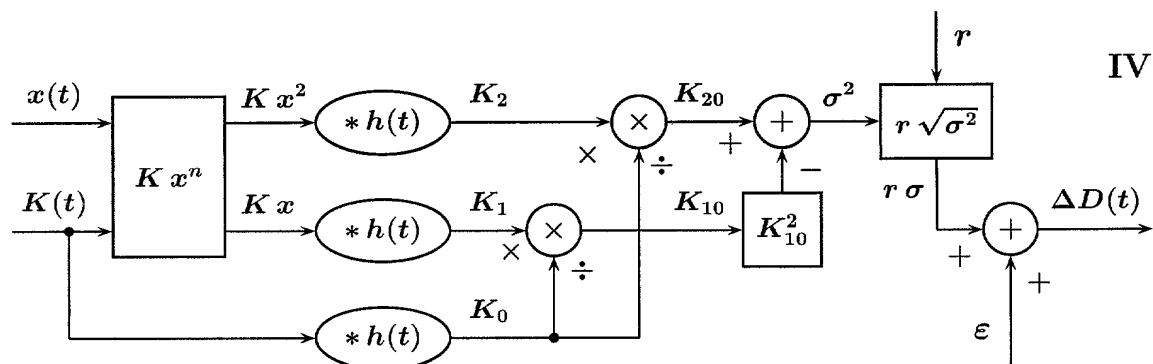
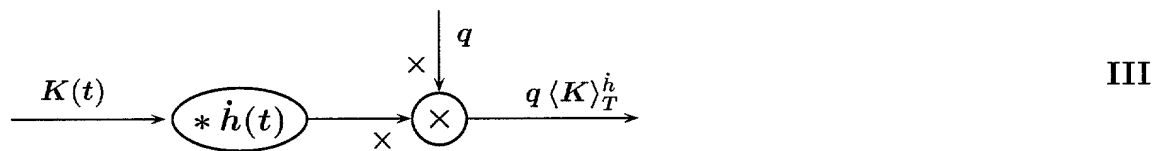
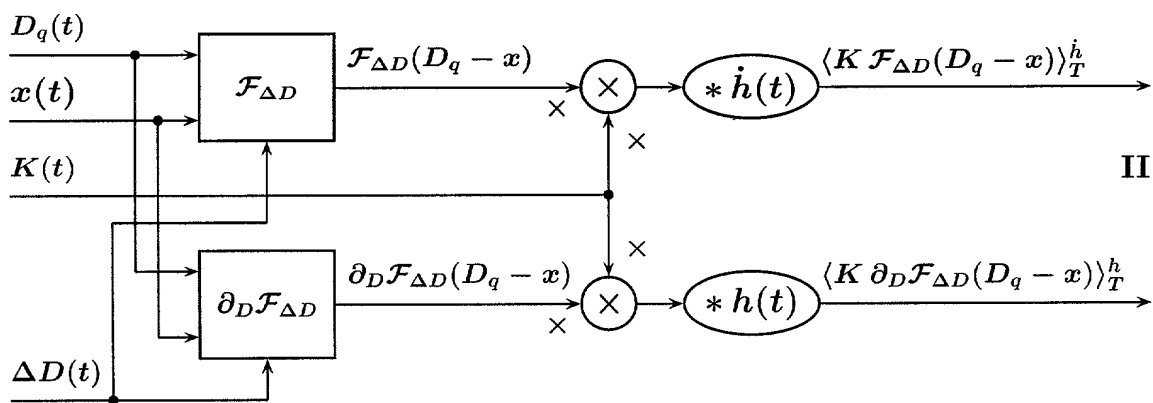
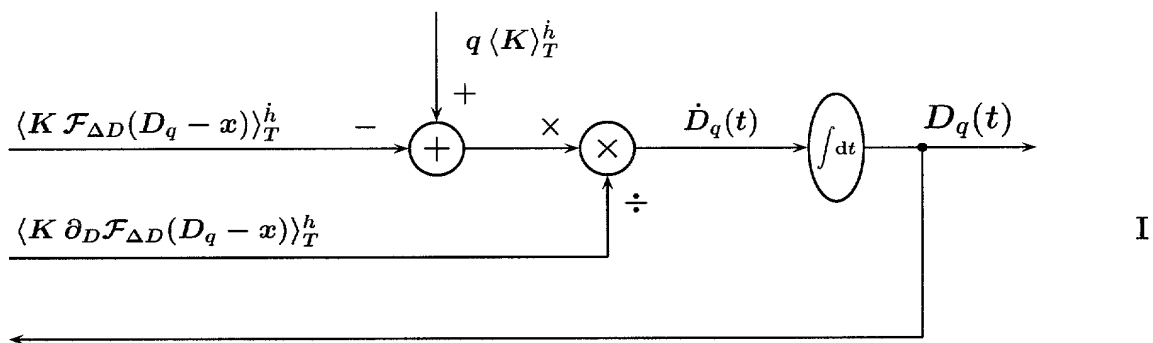


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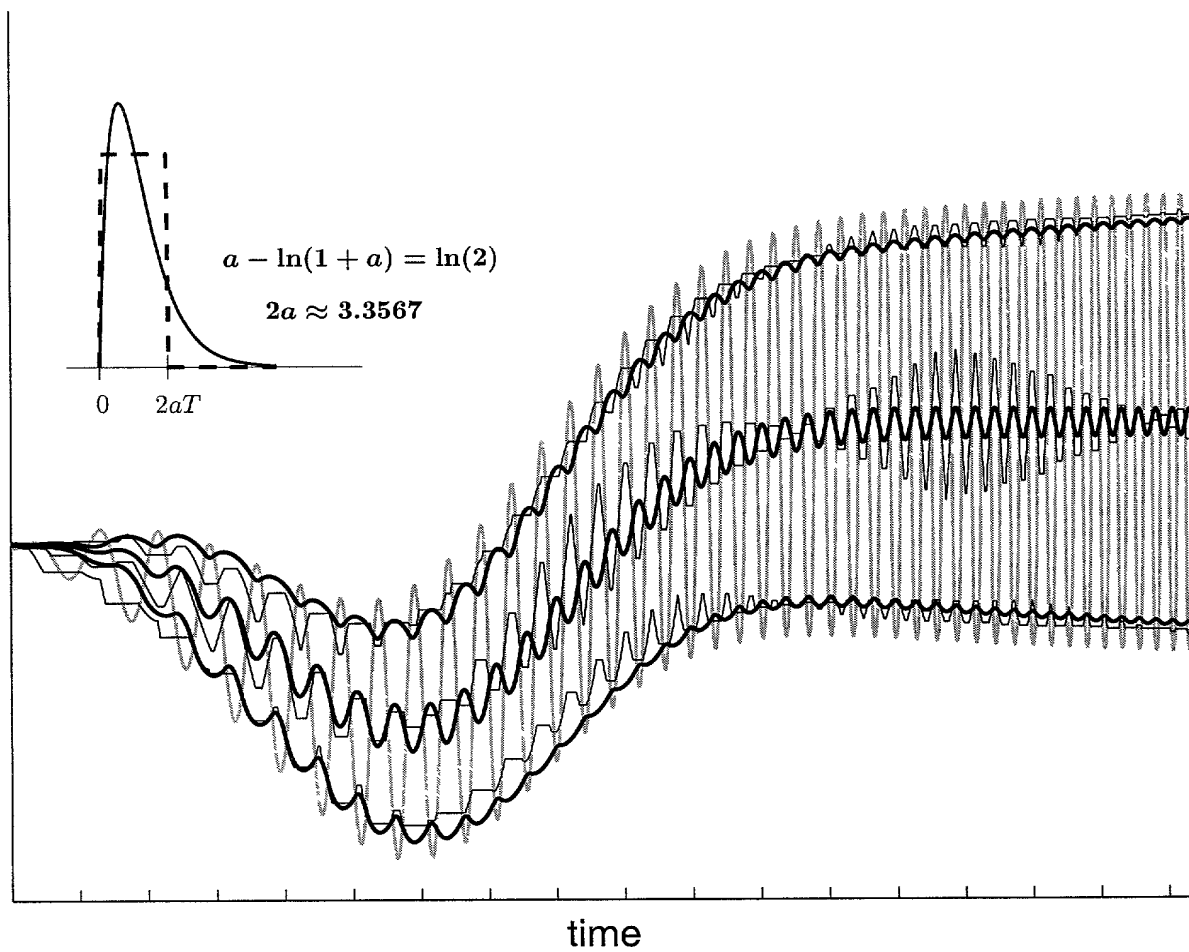


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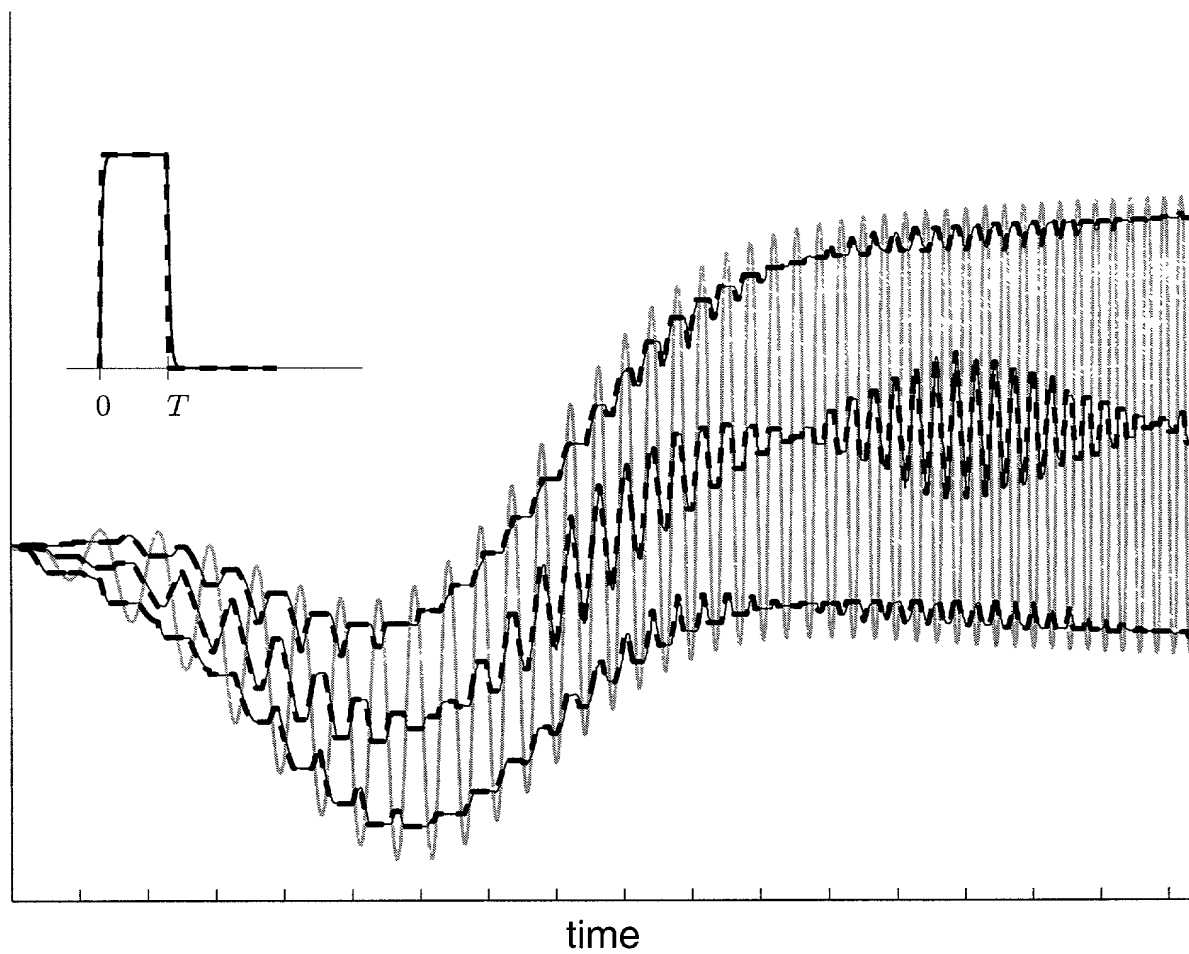


Fig. 42

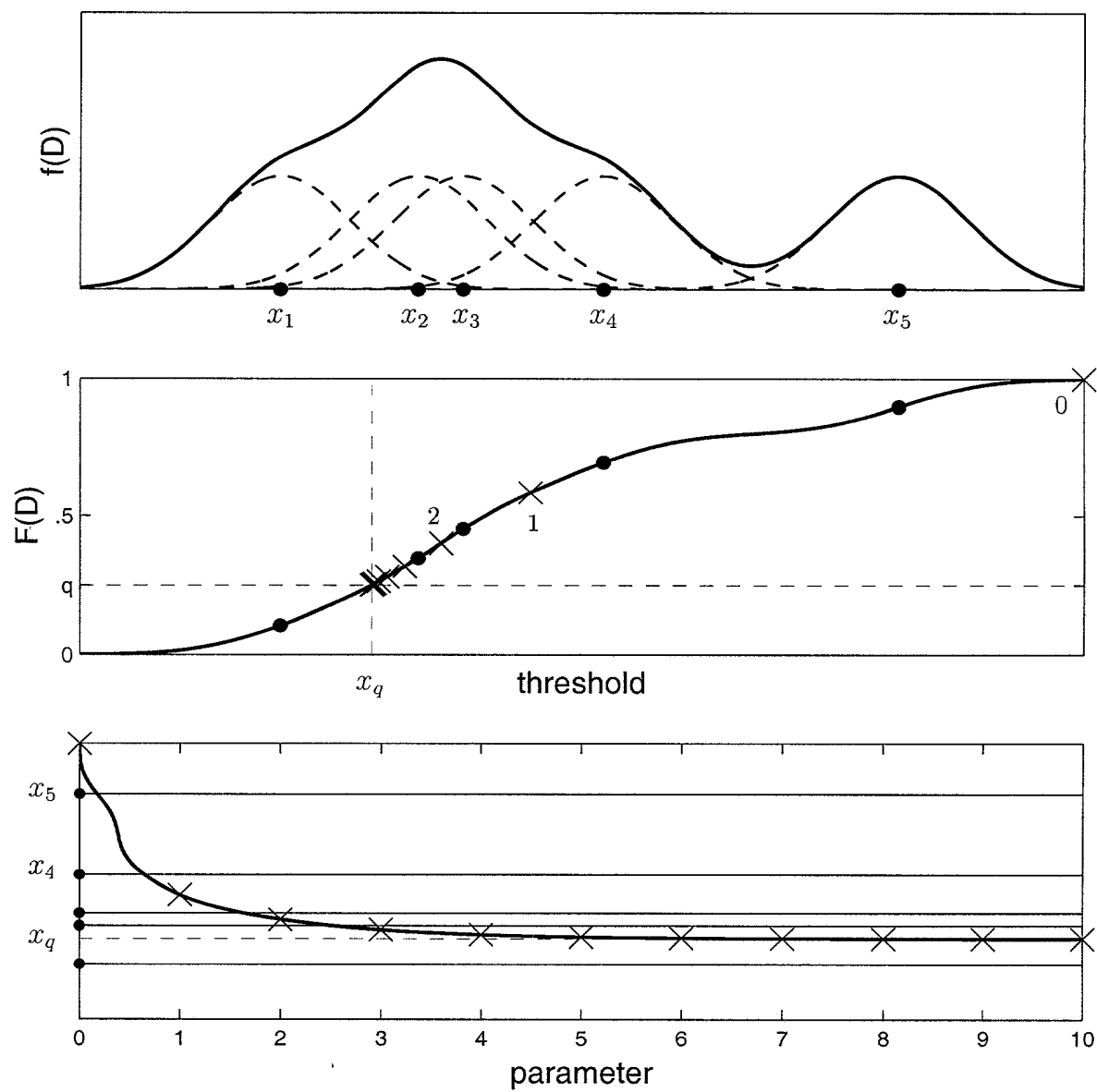
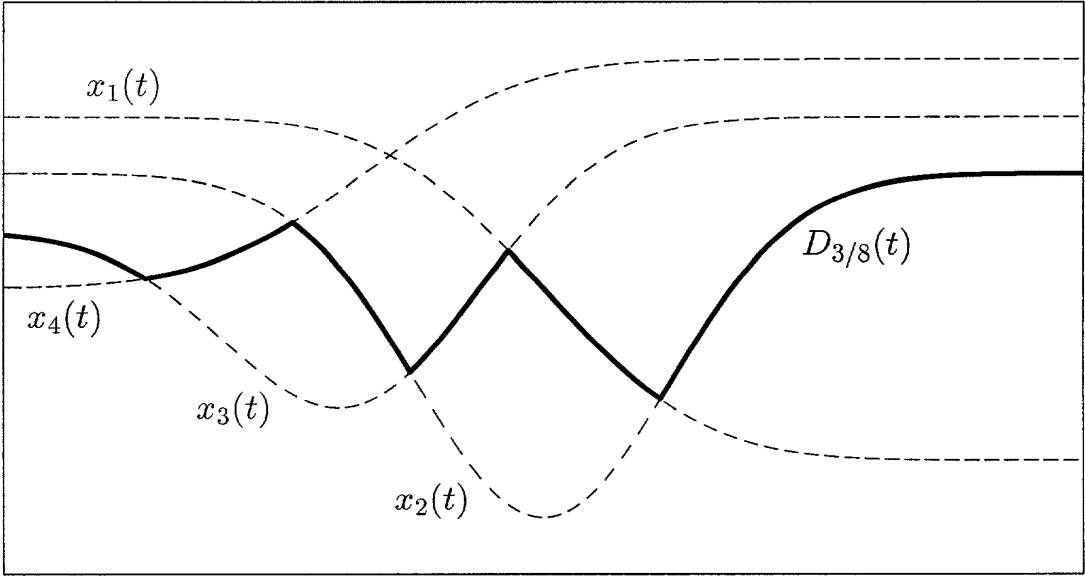


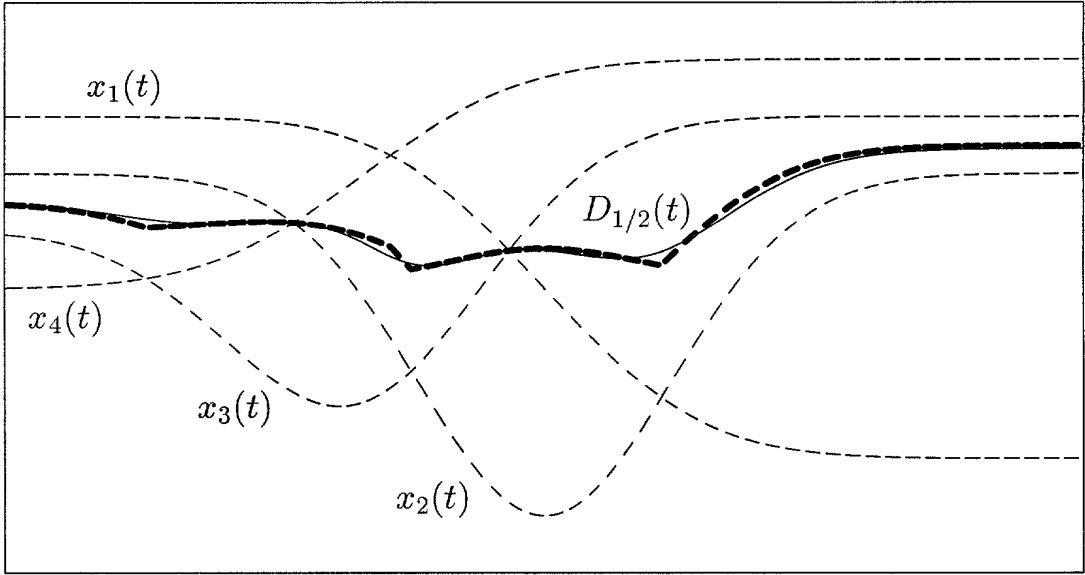
Fig. 43

I



time

II



time

Fig. 44

093124.00001

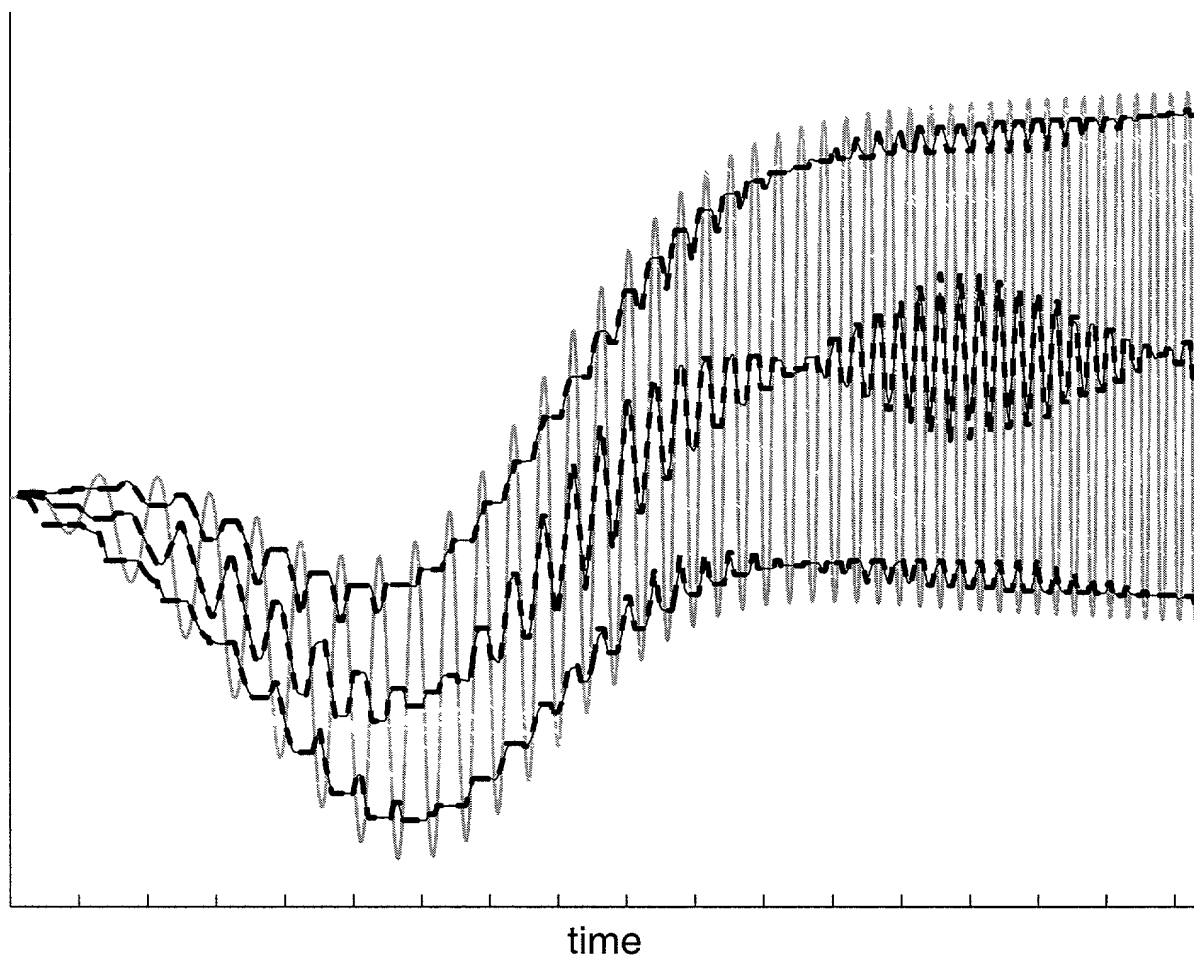


Fig. 45



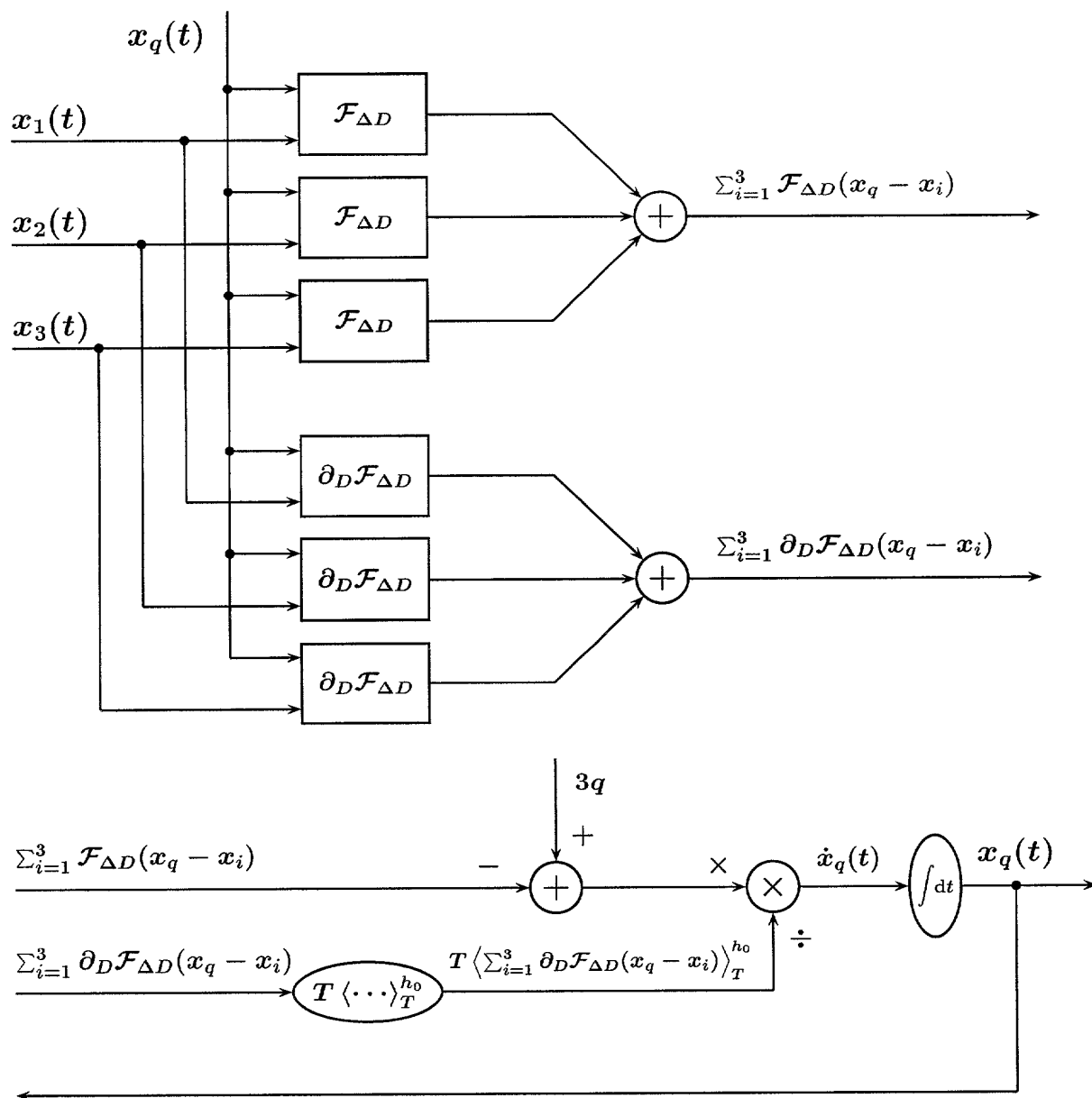
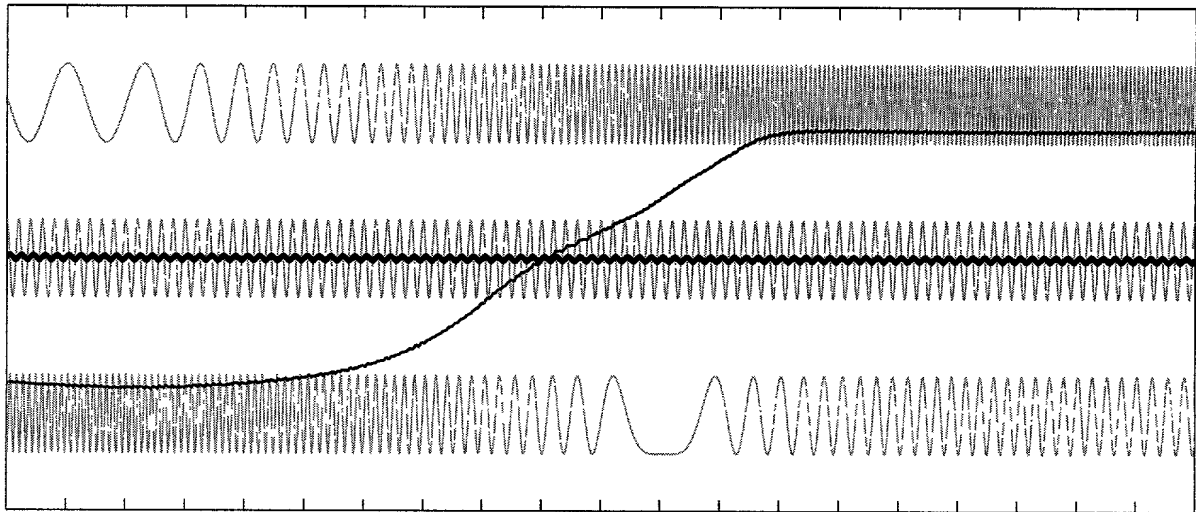


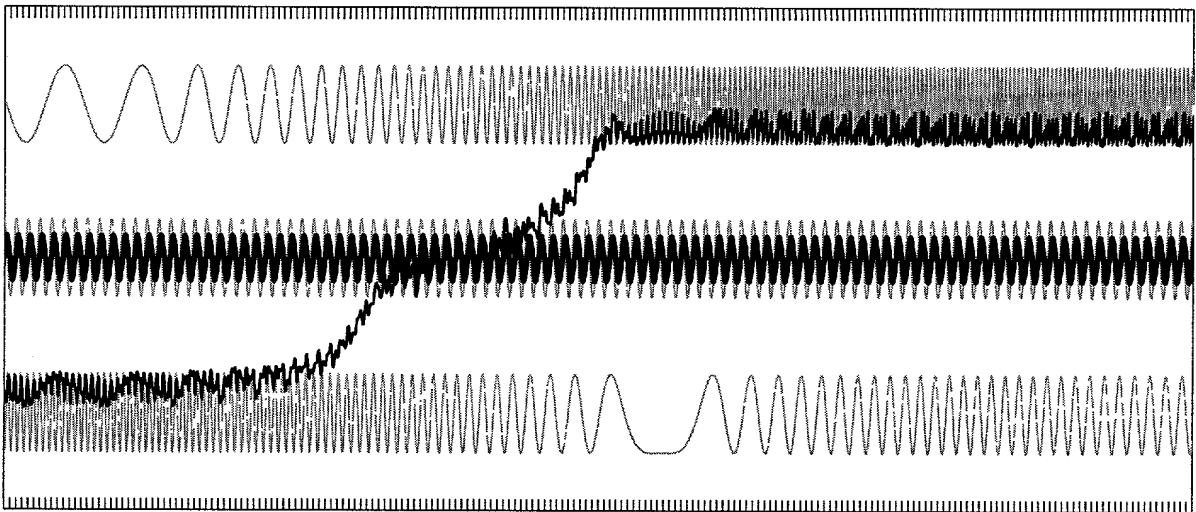
Fig. 46

I



time

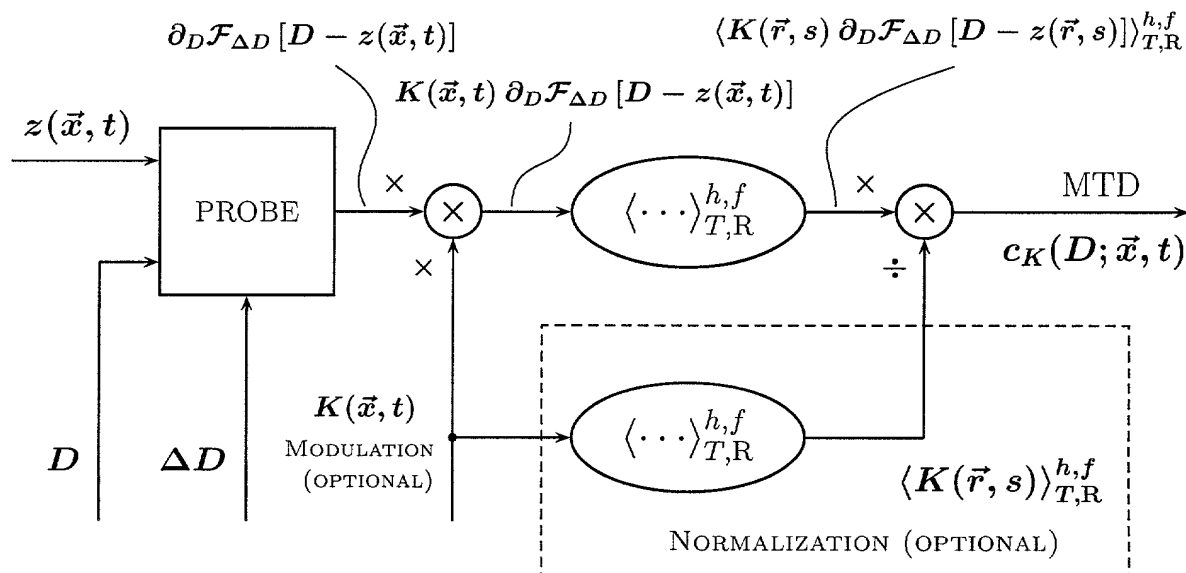
II



time

Fig. 47

# MTD FOR SCALAR FIELD



ACQUISITION SYSTEM: MEASURING DEVICE (PROBE)

HAS INPUT-OUTPUT CHARACTERISTIC OF DIFFERENTIAL DISCRIMINATOR.

$z(\vec{x}, t)$  IS INPUT SCALAR VARIABLE (FIELD). E.G., MONOCHROME 2D-SURFACE (IMAGE) CAN BE VIEWED EITHER AS CONTINUOUS 2D SCALAR FIELD, OR AS DISCRETE ENSEMBLE OF VARIABLES.

$D$  AND  $\Delta D$  ARE PARAMETERS OF PROBE.  $D$  IS DISPLACEMENT, OR THRESHOLD. IT IS ANOTHER VARIABLE (NORMALLY OF SAME NATURE AS INPUT VARIABLE), SERVING AS UNIT, OR DATUM.  $\Delta D$  IS WIDTH, OR RESOLUTION, PARAMETER OF PROBE.

$K(\vec{x}, t)$  IS MODULATING VARIABLE, GENERALLY OF DIFFERENT NATURE THAN INPUT VARIABLE. E.G.,  $K(\vec{x}, t) = \text{constant}$  LEADS TO MTD AS AMPLITUDE DENSITY, AND  $K(\vec{x}, t) = |\dot{z}(\vec{x}, t)|$  LEADS TO MTD AS COUNTING DENSITY/RATE.

Fig. 48

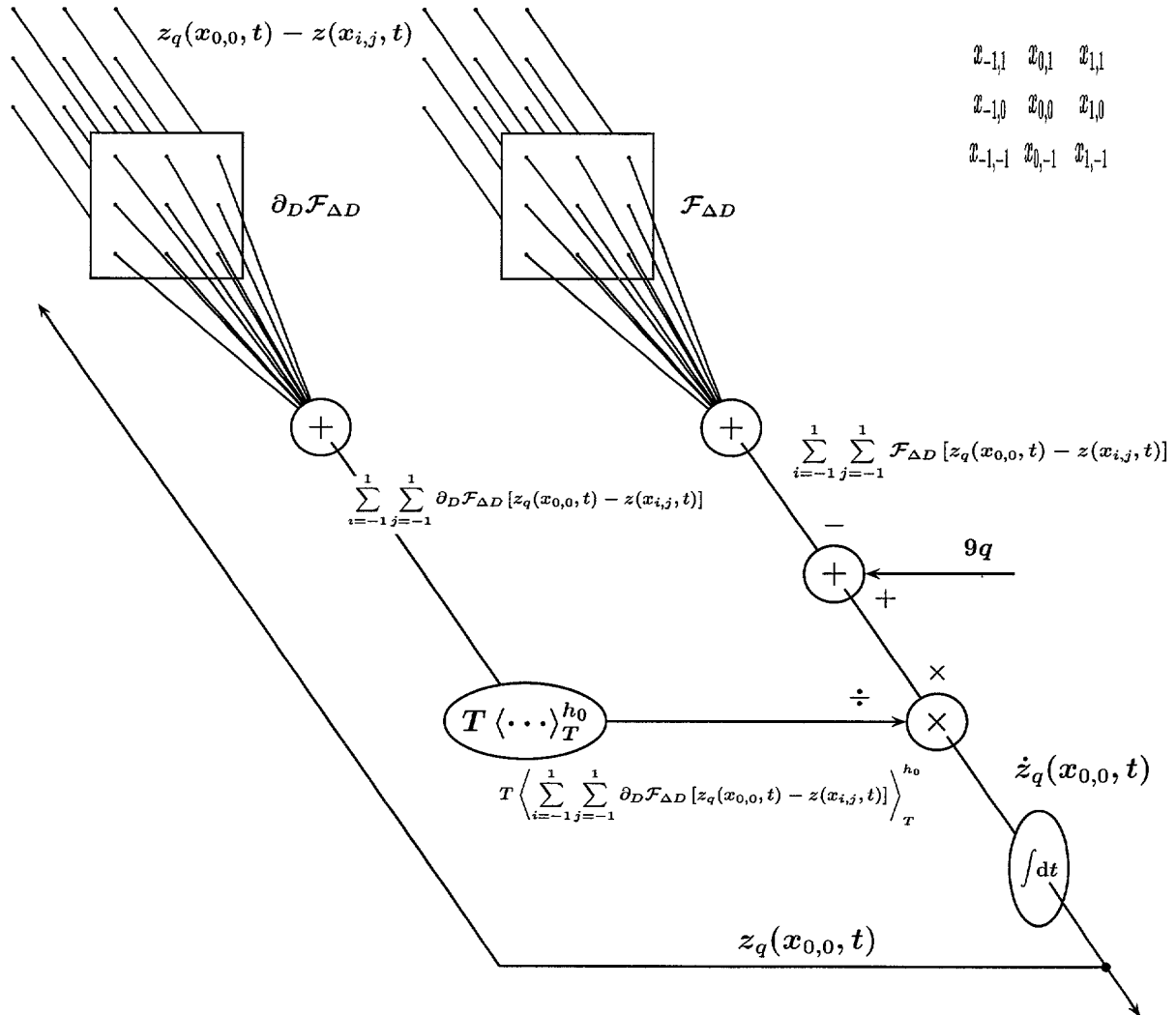


Fig. 49

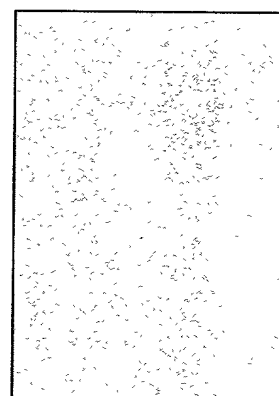
1



2



3a ( $n = 0$ )



3b ( $n = N$ )



3c ( $n = 2N$ )



3d ( $n = 3N$ )



3e ( $n = 4N$ )



3f ( $n = 6N$ )



3g ( $n = 10N$ )

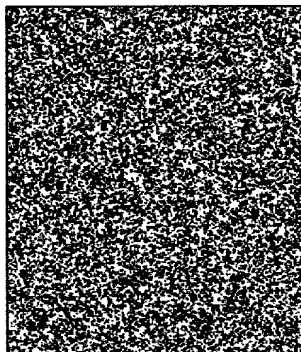


Fig. 50

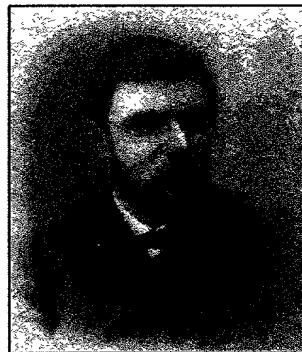
1a



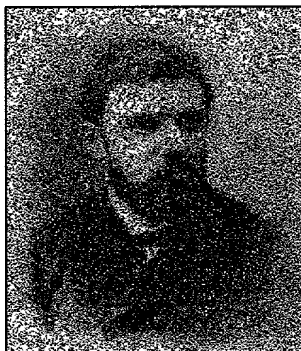
2a



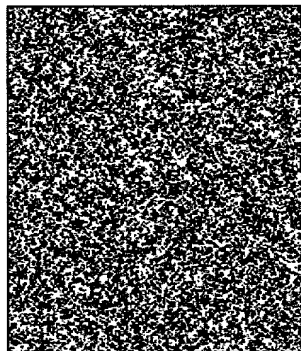
3a



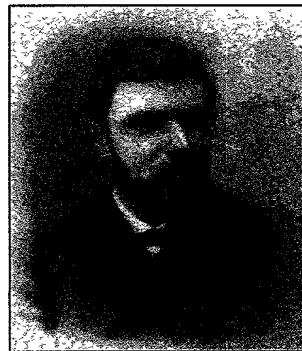
1b



2b



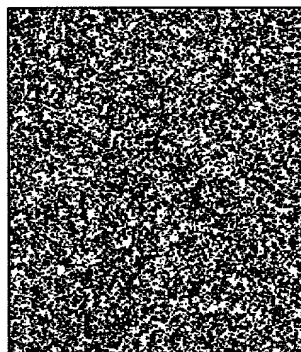
3b



1c



2c



3c

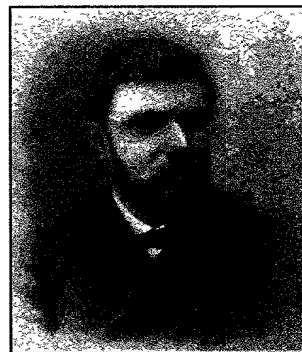
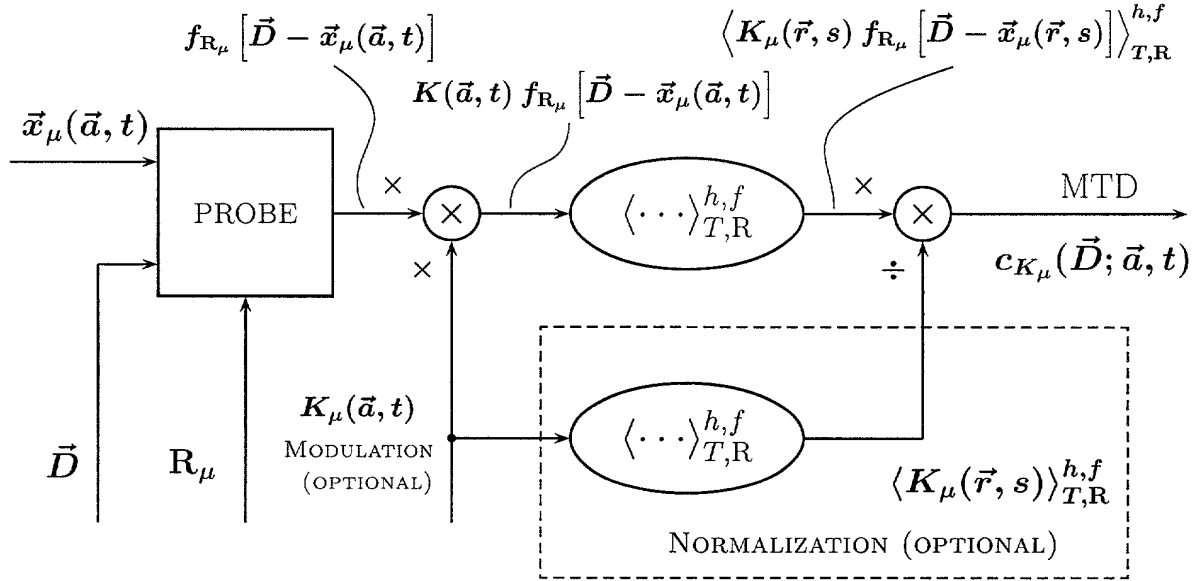


Fig. 51

0921524.080301

# MTD FOR COMPONENT OF ENSEMBLE OF VECTOR FIELDS



ACQUISITION SYSTEM: MEASURING DEVICE (PROBE)

HAS INPUT-OUTPUT CHARACTERISTIC OF DIFFERENTIAL DISCRIMINATOR.

$\vec{x}_\mu(\vec{a}, t)$  IS INPUT VECTOR VARIABLE (FIELD). E.G., TRUCOLOR IMAGE CAN BE VIEWED AS CONTINUOUS 3D VECTOR FIELD (WITH 2D POSITION VECTOR  $\vec{a}$ ).

$\vec{D}$  AND  $R_\mu$  ARE PARAMETERS OF PROBE.  $\vec{D}$  IS DISPLACEMENT, OR THRESHOLD. IT IS ANOTHER VARIABLE (NORMALLY OF SAME NATURE AS INPUT VARIABLE), SERVING AS UNIT, OR DATUM.  $R_\mu$  IS WIDTH, OR RESOLUTION, PARAMETER.

$K_\mu(\vec{a}, t)$  IS MODULATING VARIABLE, GENERALLY OF DIFFERENT NATURE THAN INPUT VARIABLE. E.G.,  $K(\vec{a}, t) = \text{constant}$  LEADS TO MTD AS AMPLITUDE DENSITY, AND  $K_\mu(\vec{a}, t) = |\dot{\vec{x}}_\mu(\vec{a}, t)|$  LEADS TO MTD AS COUNTING DENSITY/RATE.

Fig. 52

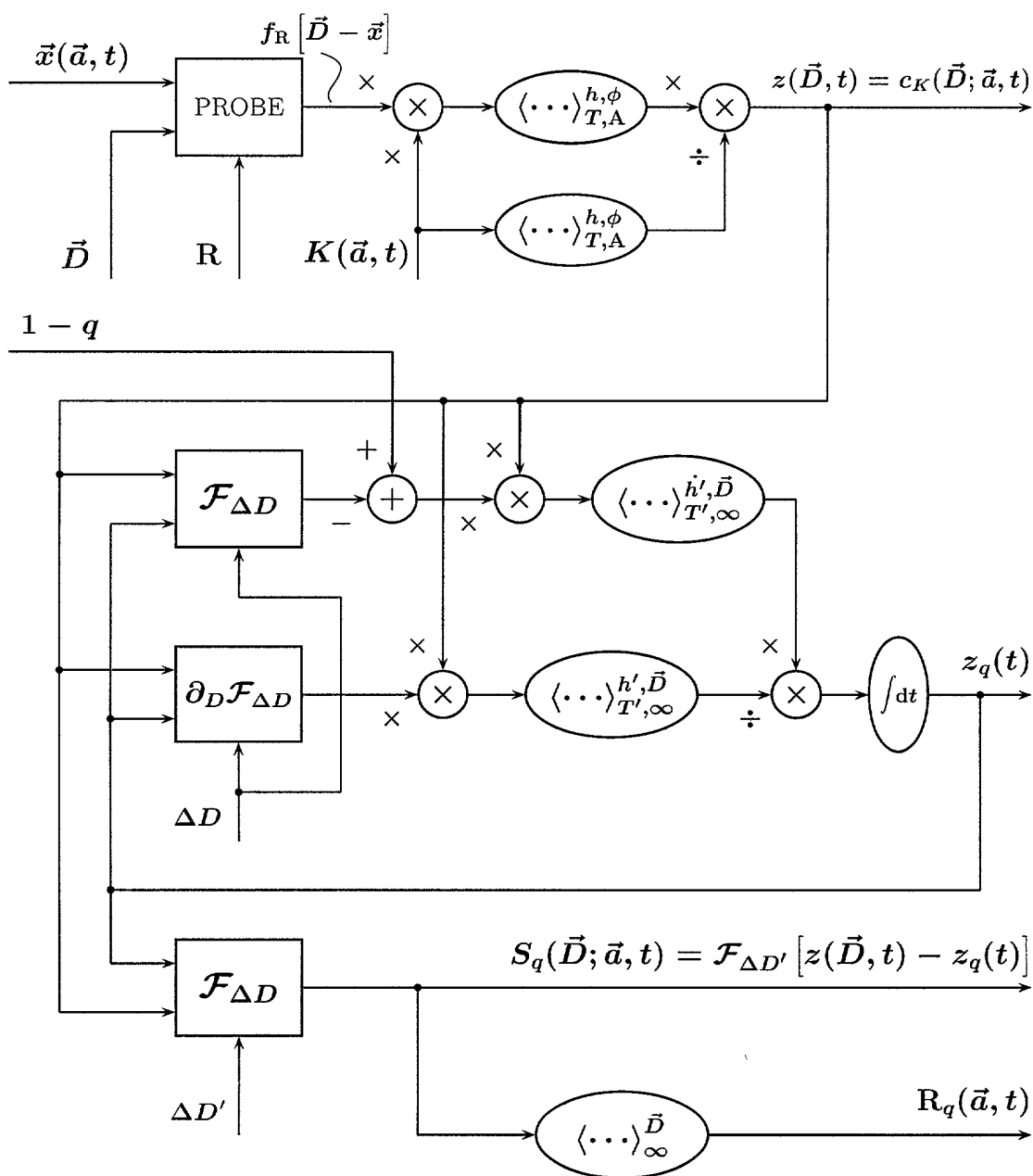


Fig. 53



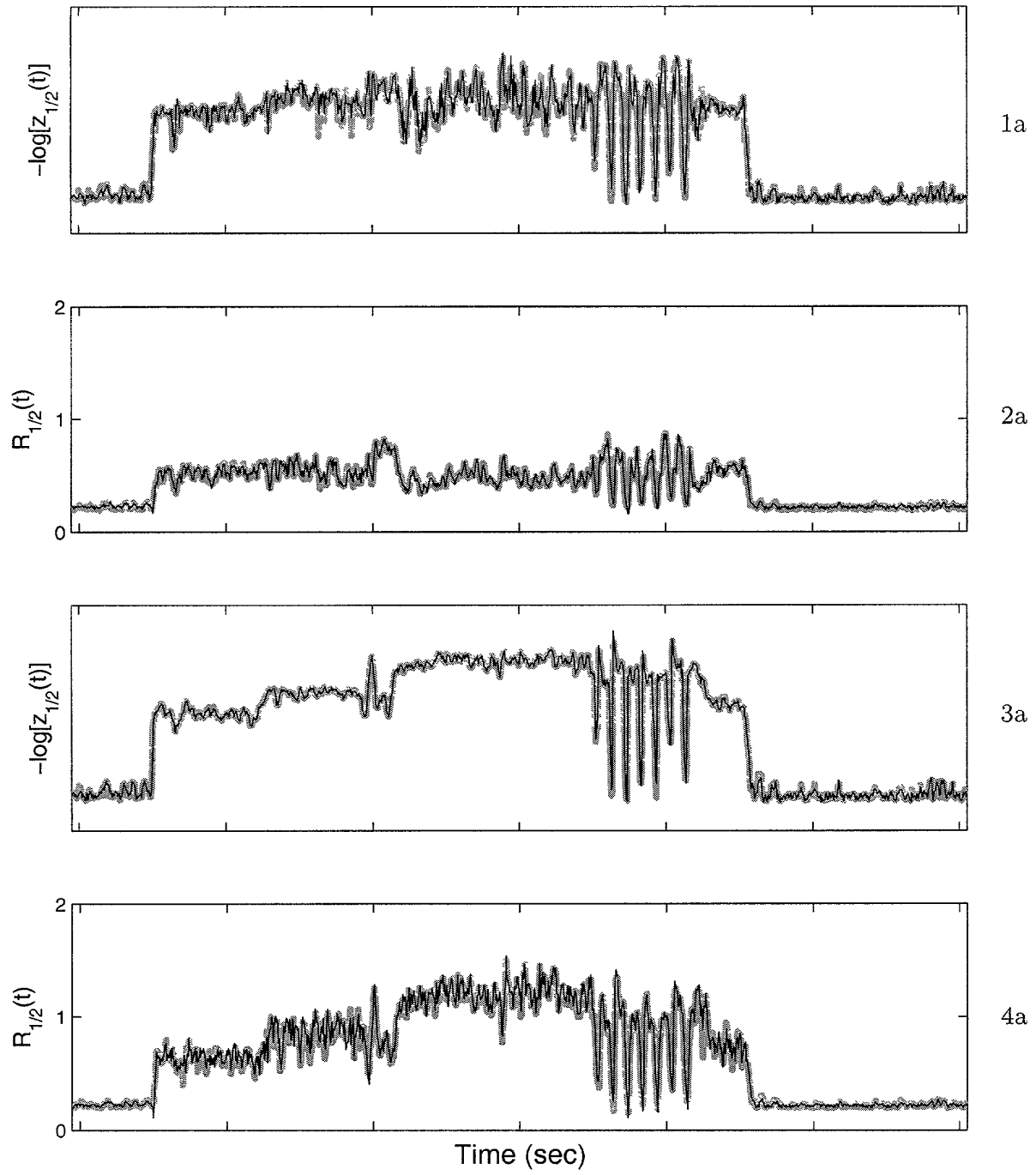


Fig. 54 a

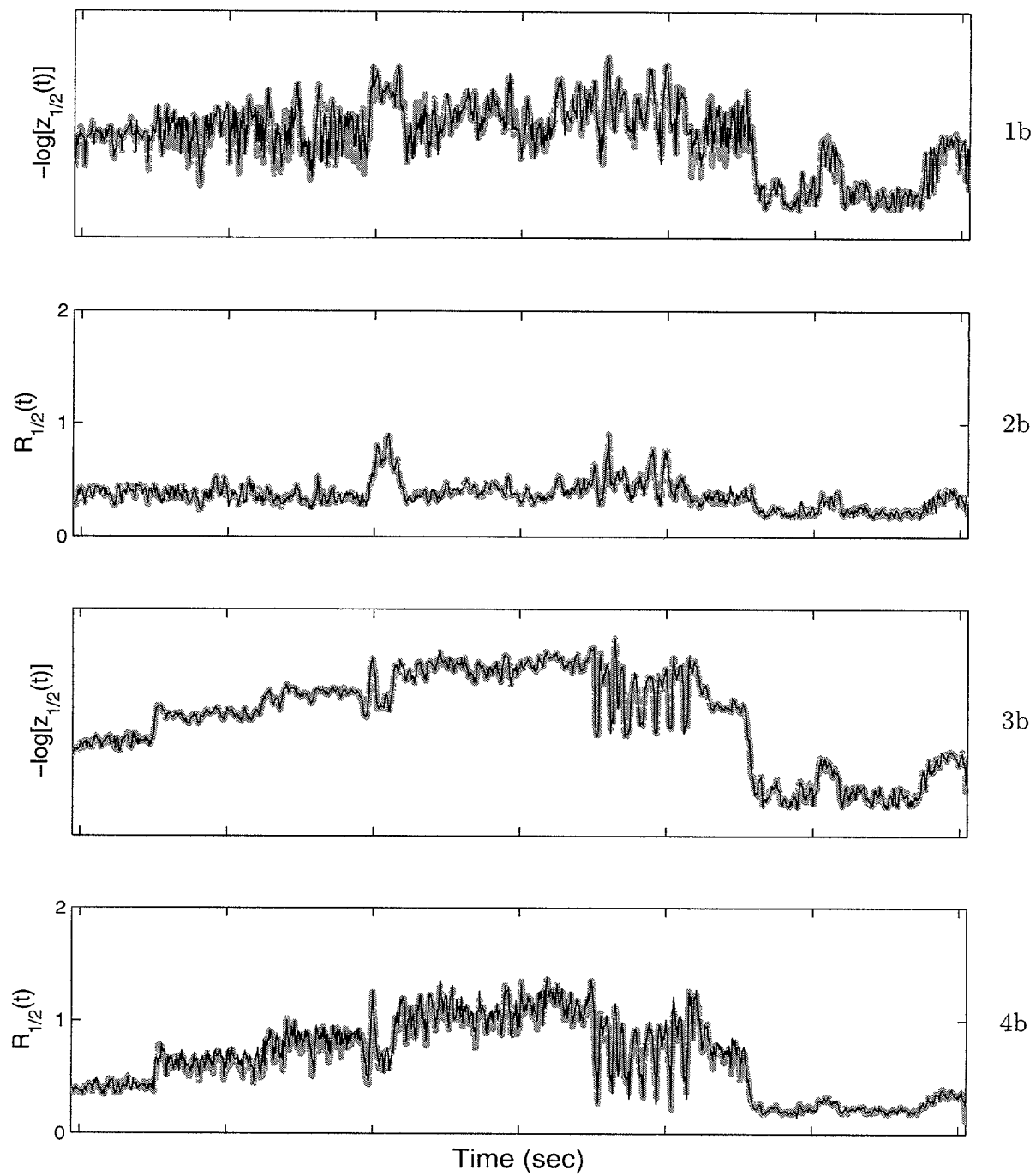


Fig. 54 b

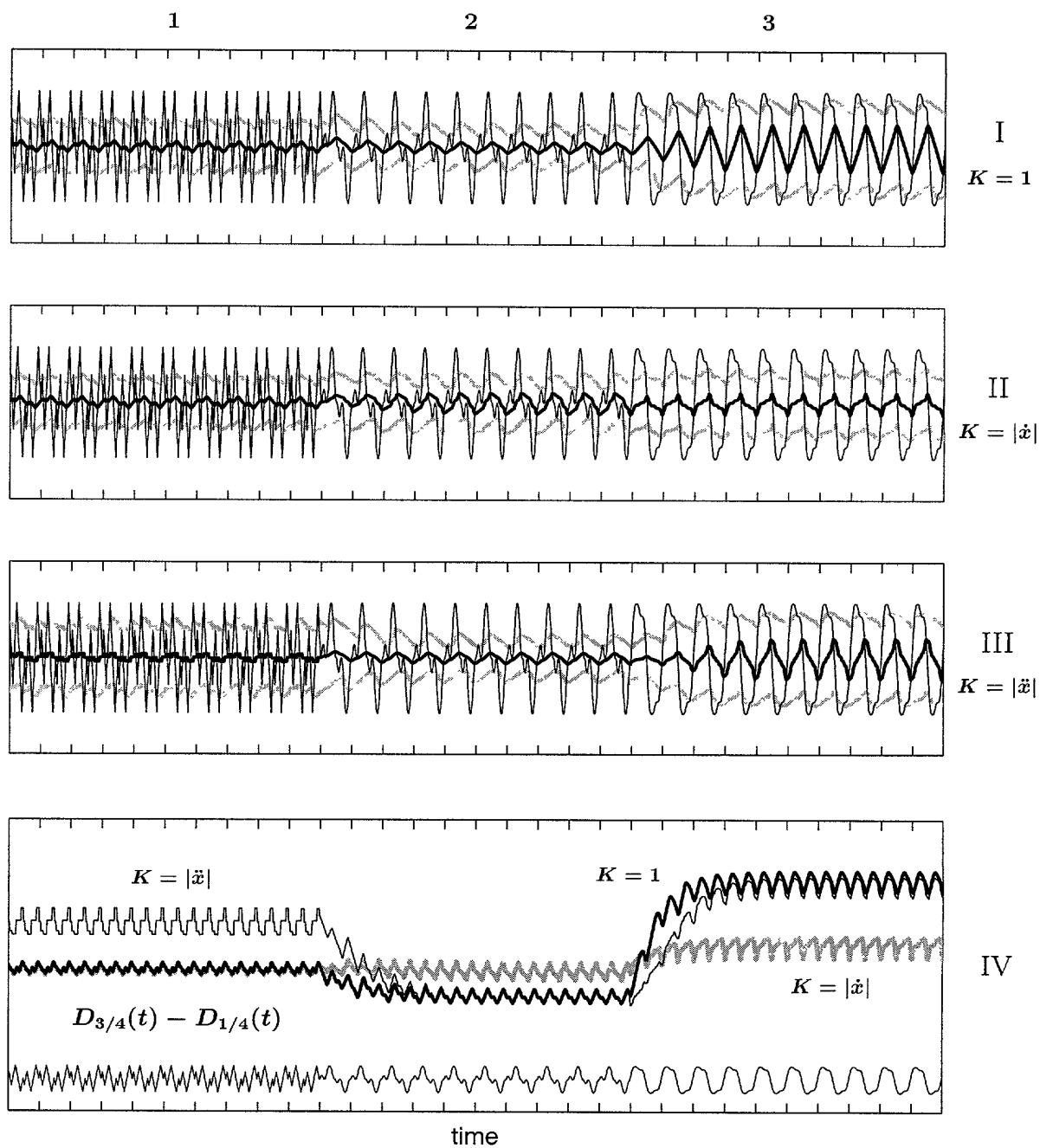


Fig. 55

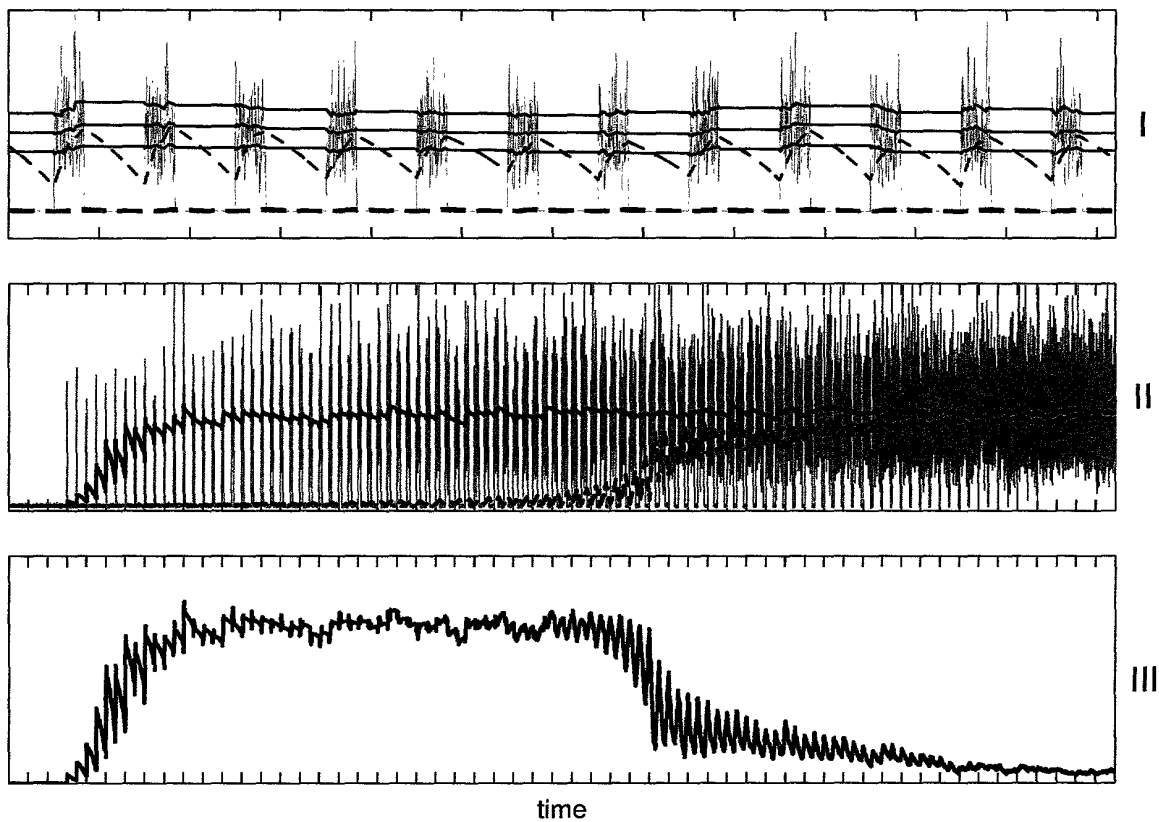


Fig. 56

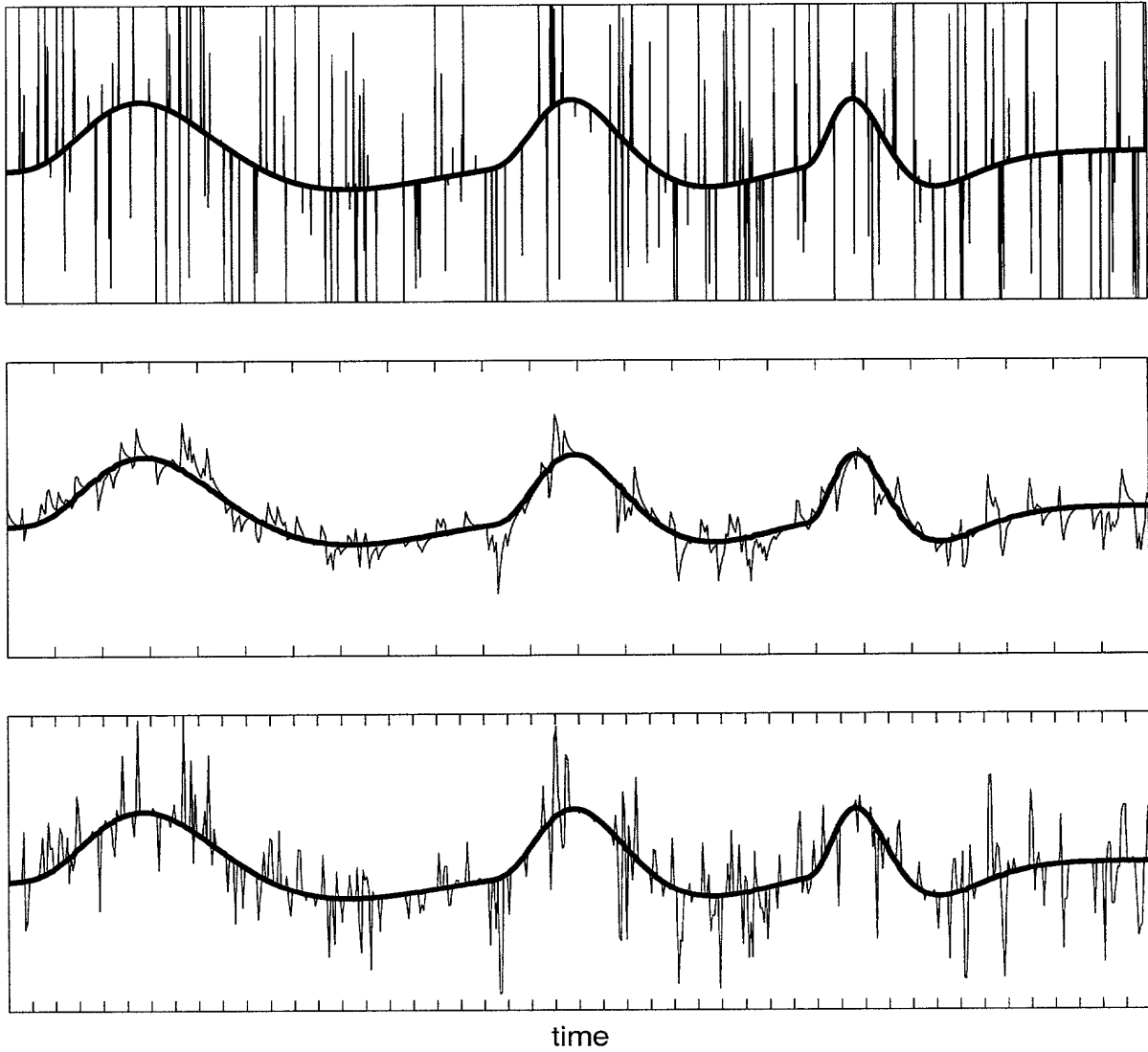
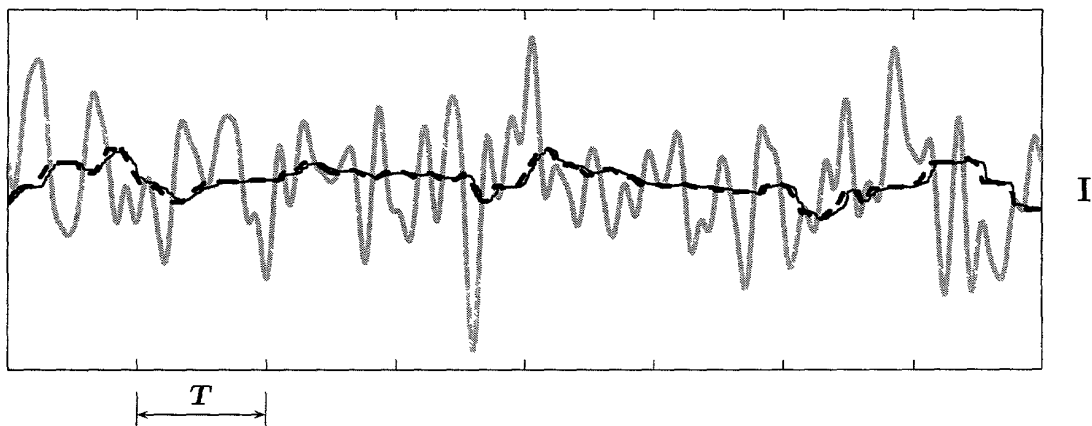
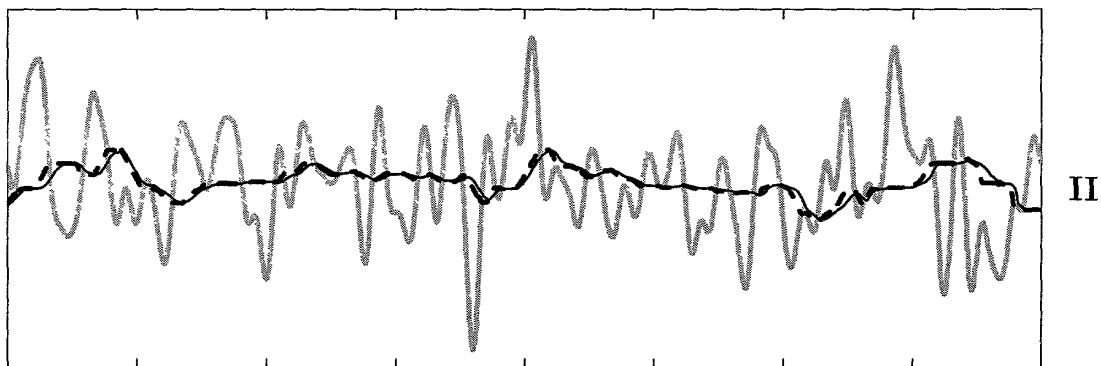


Fig. 57

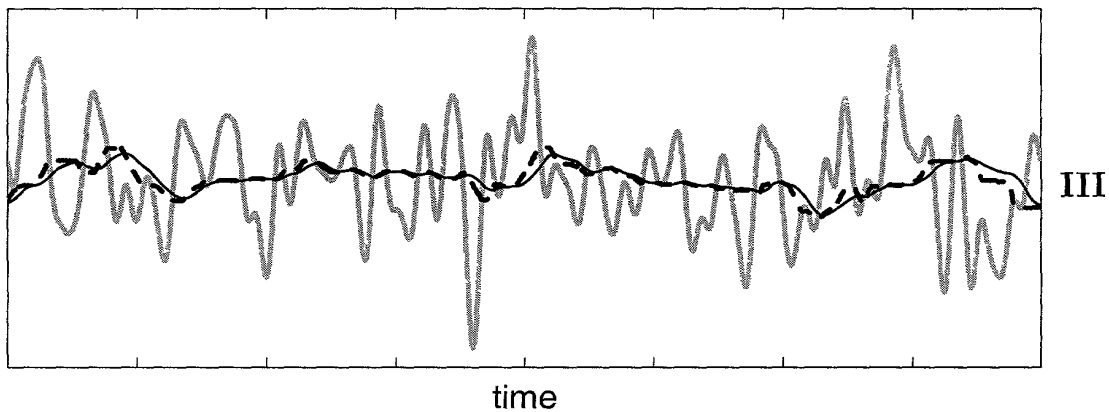
OUTPUTS OF DIGITAL MEDIAN FILTER AND SQUARE WINDOW MEDIAN AARF



OUTPUTS OF DIGITAL MEDIAN FILTER AND SQUARE WINDOW MEDIAN ARS

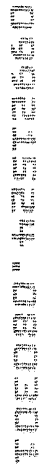


OUTPUTS OF DIGITAL MEDIAN FILTER AND ANALOG MEDIAN FILTER BASED ON IDEAL MEASURING SYSTEM

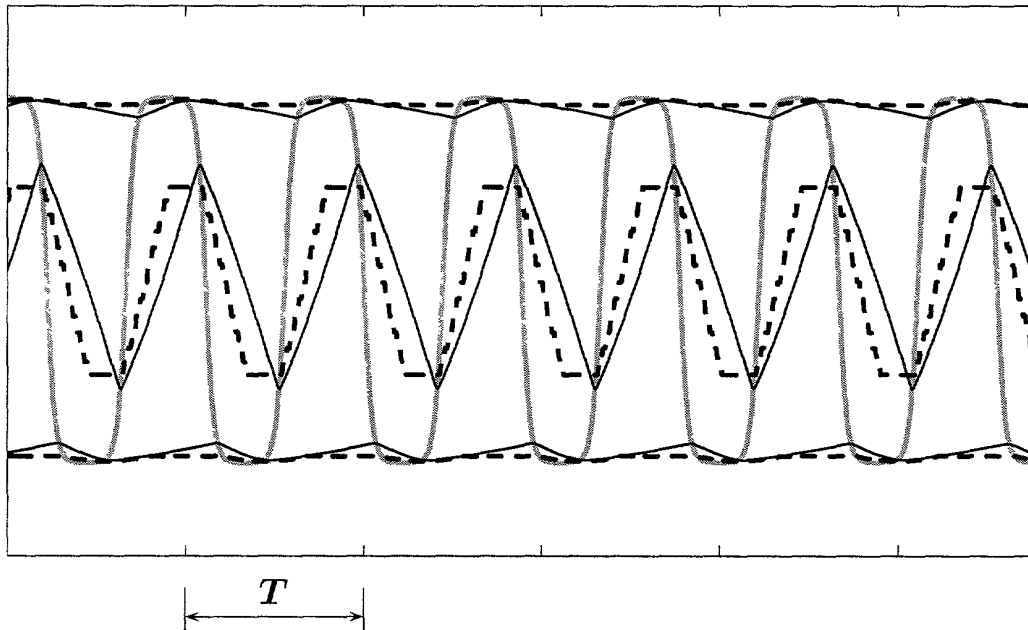


time

Fig. 59 a

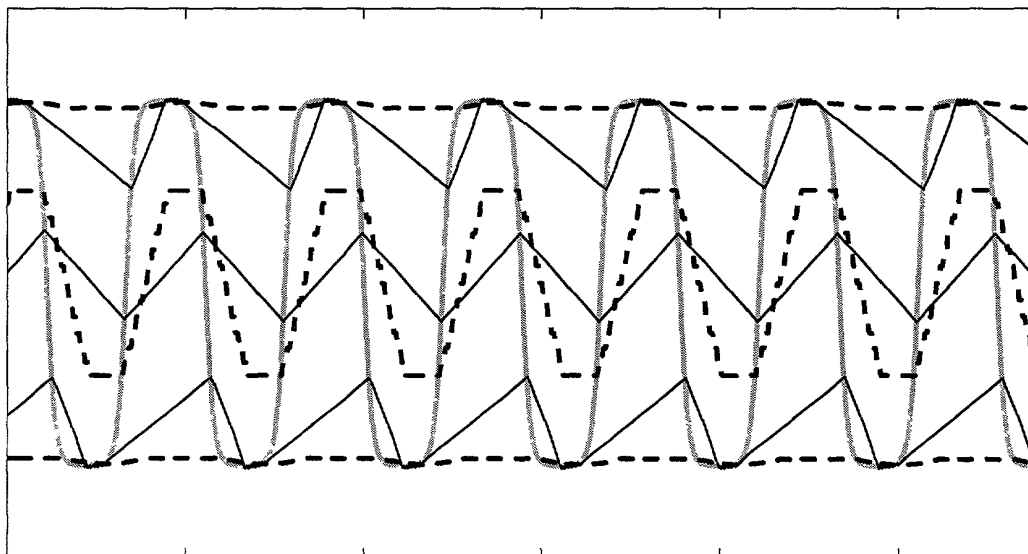
[illegible]

QUARTILE OUTPUTS OF DIGITAL RANK ORDER FILTER AND  $RC_{10}$  AARF



I

QUARTILE OUTPUTS OF DIGITAL RANK ORDER FILTER  
 AND  $RC_{10}$  ARF BASED ON IDEAL MEASURING SYSTEM



II

time

Fig. 60



# TRANSFORMING INPUT VARIABLE INTO MRT VARIABLE

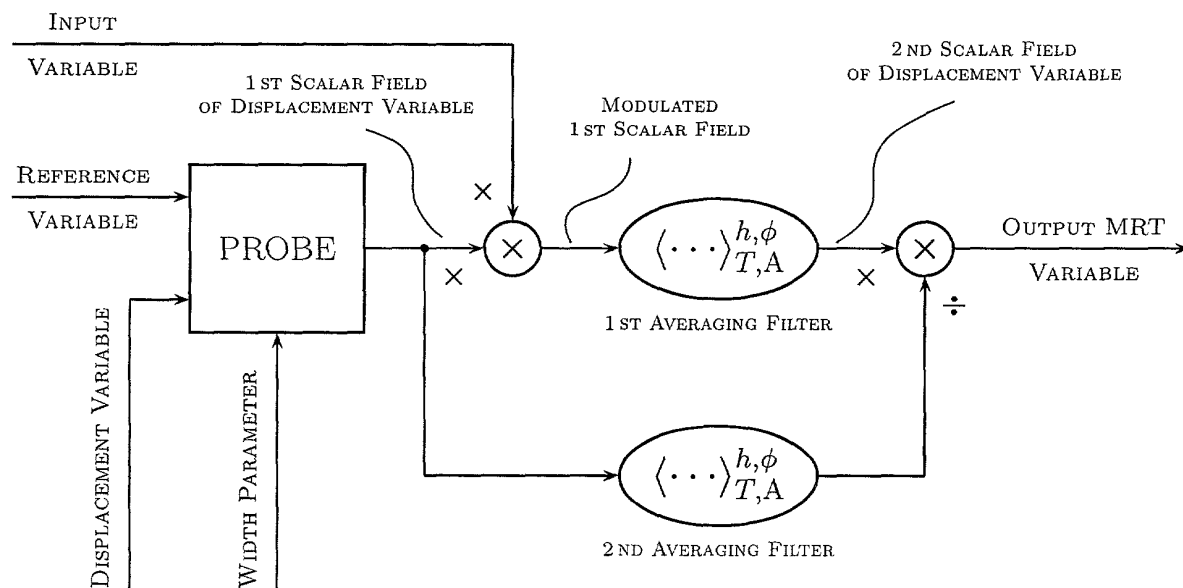


Fig. 61

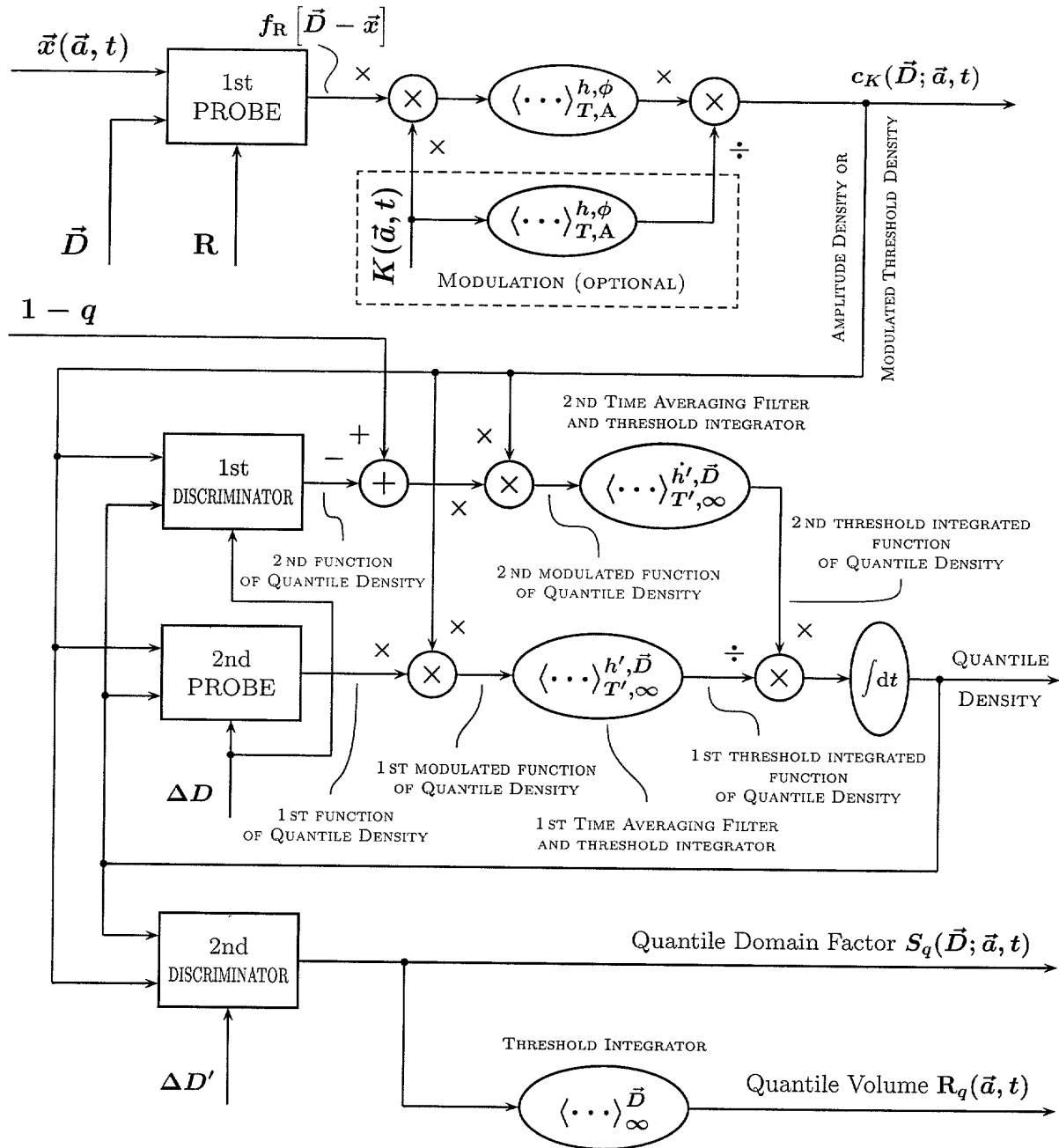


Fig. 62

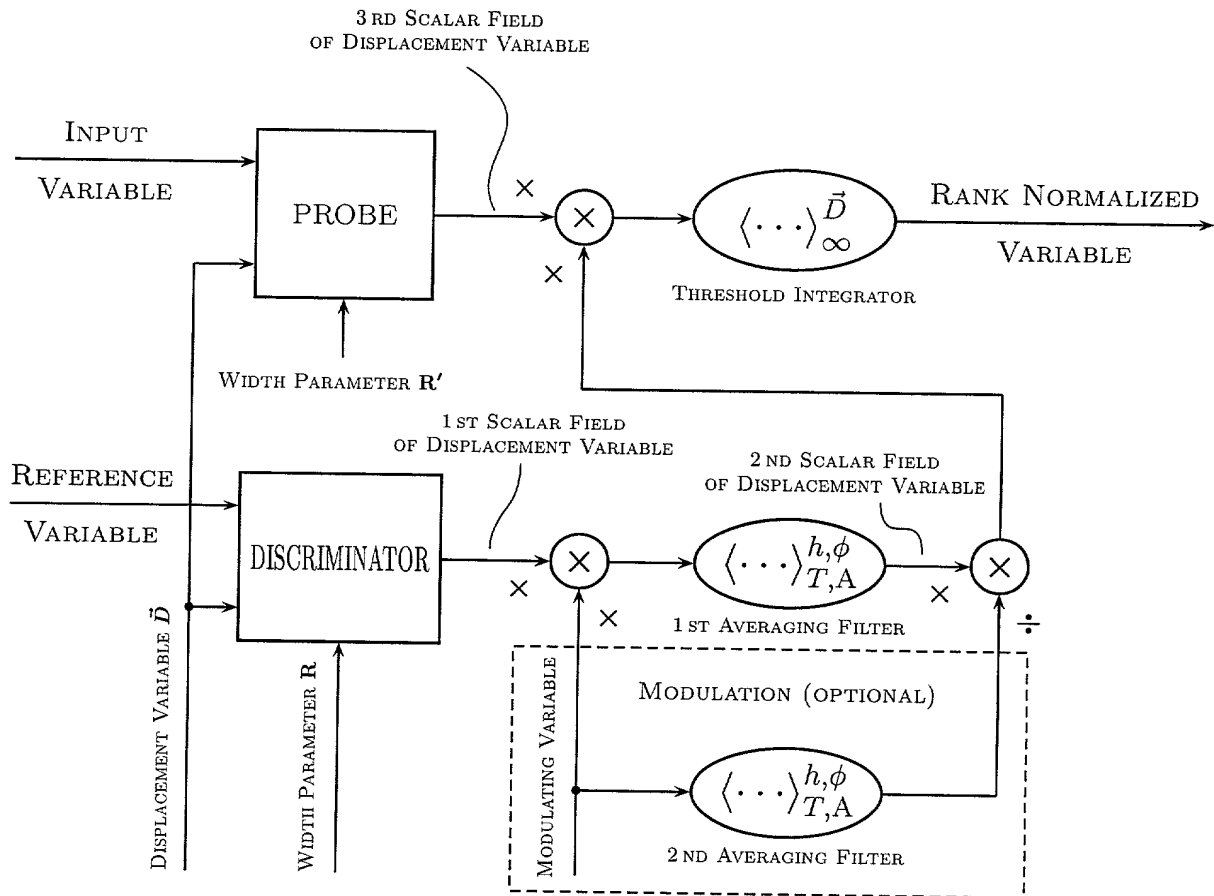


Fig. 63

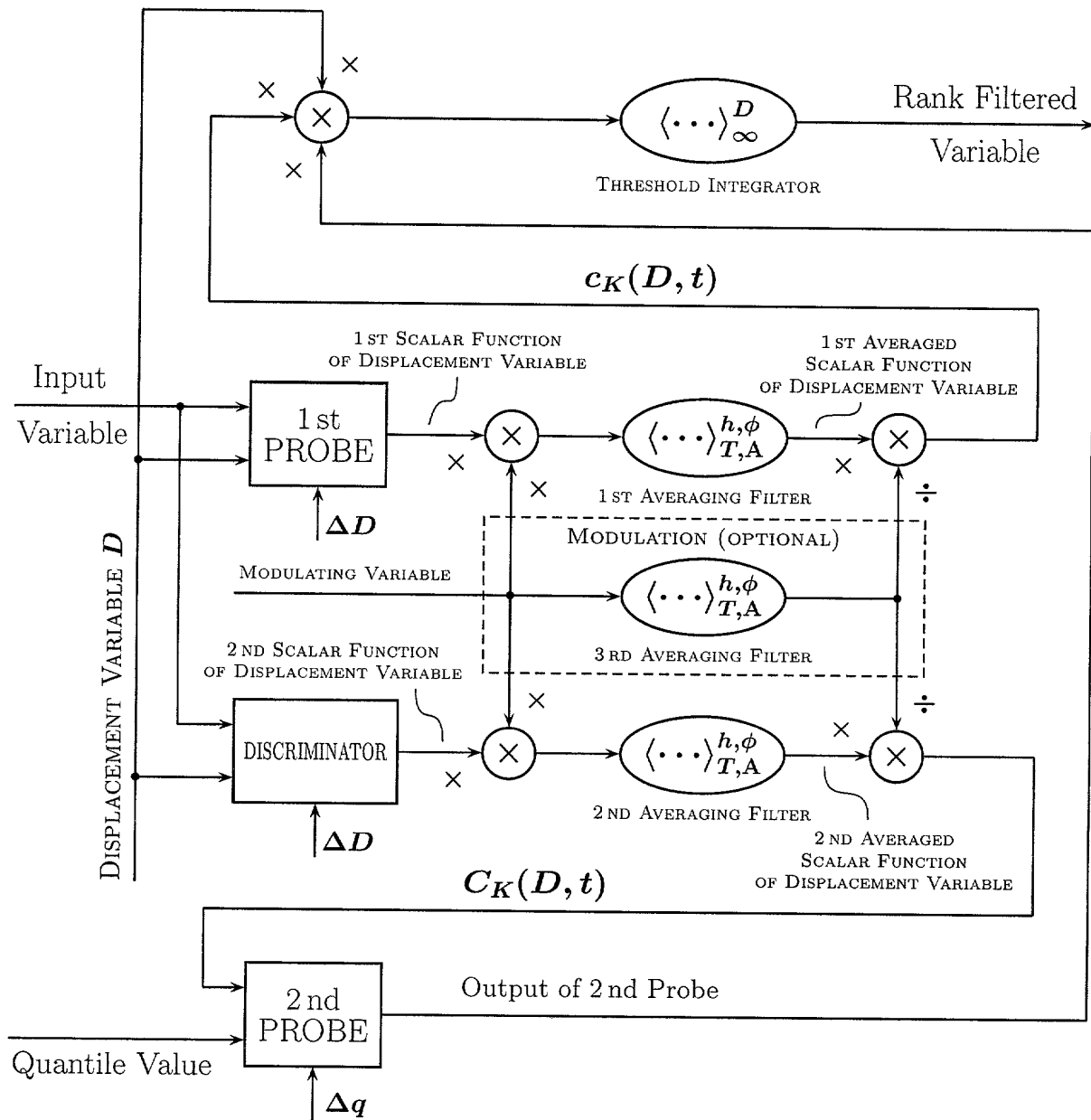


Fig. 64

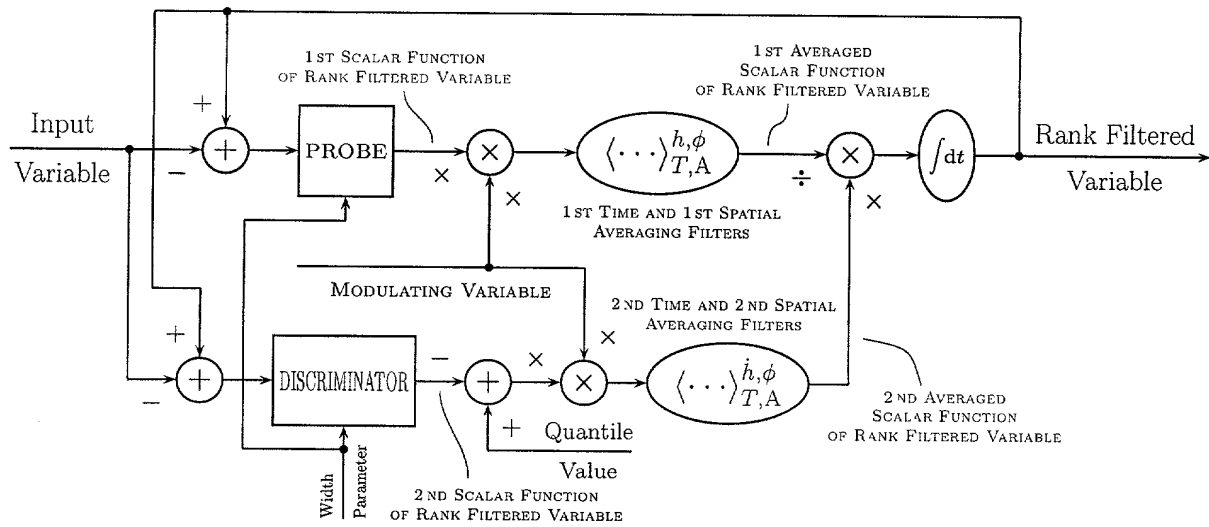


Fig. 65

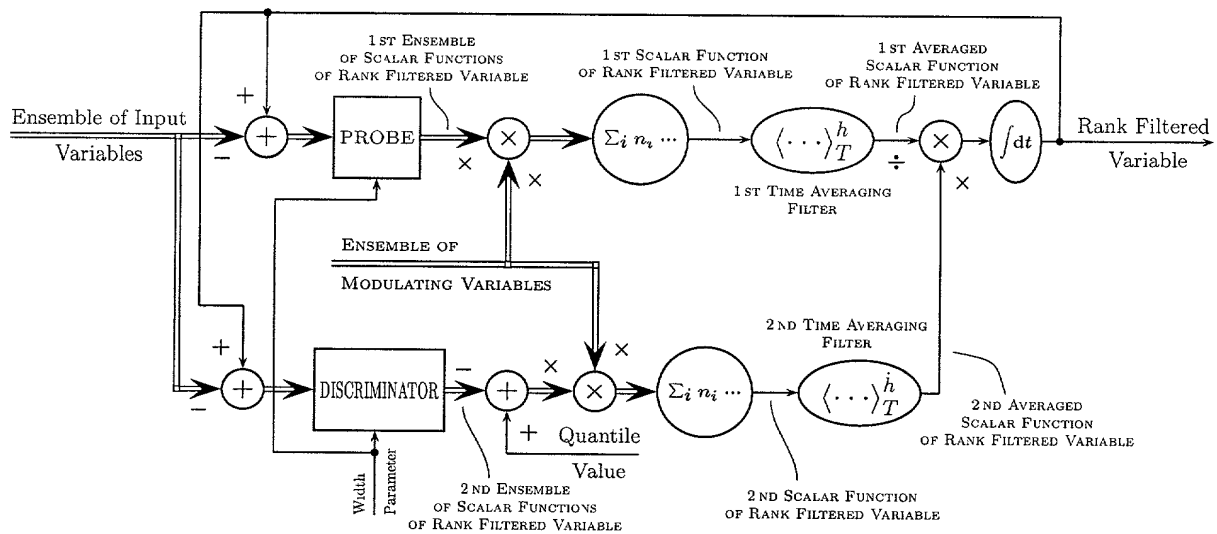


Fig. 66